United States Court of Appeals
for the
District of Columbia Circuit

TRANSCRIPT OF RECORD

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United States Court of Appeals for the District of Columbia

APRIL TERM, 1936.

No. 6681

871

STEPHENS PUMP COMPANY AND CHARLES D. STEPHENS, APPELLANTS,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS.

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA.

FILED APRIL 6, 1936

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United States Court of Appeals for the District of Columbia

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United States Court of Appeals for the District of Columbia

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a Supreme Court of the District of Columbia.

No. 57650. IN EQUITY.

STEPHENS PUMP COMPANY,
and
CHARLES D. STEPHENS, *Plaintiffs,*
vs.
CONWAY P. COE, Commissioner of Patents, *Defendant.*

UNITED STATES OF AMERICA,
District of Columbia, ss:

BE IT REMEMBERED, That in the Supreme Court of the District of Columbia, at the City of Washington, in said District, at the times hereinafter mentioned, the following papers were filed and proceedings had, in the above-entitled cause, to wit:—

1 *Bill of Complaint for Letters Patent.*

Filed August 31 1934

In the Supreme Court of the District of Columbia

IN EQUITY No. 57650

STEPHENS PUMP COMPANY,
and
CHARLES D. STEPHENS, *Plaintiffs,*
vs.
CONWAY P. COE, Commissioner of Patents, *Defendant.*

To The Honorable The Judges Of The Supreme Court Of The District of Columbia:

Plaintiffs allege that:

1. The plaintiff, Stephens Pump Company, is a corporation duly organized and existing under the laws of the State of Delaware, and having its principal place of business at Round Rock, Texas. The plaintiff, Charles D. Stephens,

is a citizen of the United States and resident of San Antonio, in the County of Bexar, and State of Texas. The defendant, Conway P. Coe, in his official capacity as Commissioner of Patents, is legally domiciled in the District of Columbia.

2. The jurisdiction of this court depends upon the patent laws of the United States, this being a suit in equity under Section 4915, Revised Statutes (Comp. Stats. 9460; U. S. C. Title 35, Section 63), as amended by act of March 2, 1927, to secure an adjudication that plaintiffs are entitled to receive a patent for the invention as specified in the rejected claims hereinafter referred to or for any part thereof, as the facts in the case may appear, and that the defendant be authorized to issue such patent.

3. That heretofore, and before the 18th day of January,
1930, the plaintiff, Charles D. Stephens, being within
2 the meaning of the United States Statutes, the true,
sole, original and first inventor of certain improvements in Pumps, said improvements not having been known or used before his invention thereof, nor patented nor described in any printed publication in this country or any foreign country, before his invention or discovery thereof, nor patented nor described in any printed publication nor in public use or on sale in this country prior to the filing of any application for patent by him or his representatives or assigns, and not abandoned, duly filed in the United States Patent Office, on or about January 18, 1930, an application Serial No. 421,651, for Letters Patent for said improvements; said United States application being in full conformity with the requirements of all the statutes then in force and complying in all respects with all the requirements of law governing such cases; and a duly certified copy of said application will be produced in court as your Honors may direct.

4. That the said plaintiff, Charles D. Stephens, duly filed in the United States Patent Office on or about August 3, 1931, an application Serial No. 554,740 as a division of the above mentioned original application, Serial No. 421,651, said divisional application for Letters Patent covering the specific pumping member disclosed in his said parent application, Serial No. 421,651 and constituting a part of his original invention; said divisional application being in full

conformity with the requirements of all the statutes then in force and complying in all respects with all the requirements of law governing such cases; and a duly certified copy of said application will be produced in court as your Honors may direct.

5. That on or about the 30th day of July, 1931, the plaintiff, Charles D. Stephens, executed and delivered an
3 assignment to the plaintiff, Stephens Pump Company, of all right, title and interest in and to the said divisional application, the invention thereof and all Letters Patent to be issued upon or for the same, authorizing and requesting the Commissioner of Patents to issue any United States patent which might be granted upon or for said invention to plaintiff, Stephens Pump Company, and such assignment was duly recorded in the Patent Office of the United States on or about August 3, 1931 in Liber O-149, page 121 of the Transfers of Patents, and a duly certified copy of said assignment will be produced in Court as your Honors may direct.

6. That said U. S. divisional application for patent was duly prosecuted in the United States Patent Office, and the following claims were submitted but finally rejected by the Primary Examiner, erroneously, as plaintiffs believe:

1. An expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end.

2. A substantially cylindrical expansible hollow pumping member having open ends, an external annular flange at one end, and an internal flange at the other end.

3. A substantially cylindrical expansible hollow pumping member made of rubber and having open ends, an external annular flange at one end, and an internal annular flange at the other end.

4. A substantially cylindrical expansible hollow pumping member, the body of said member being made of flexible rubber, and the ends of said member being made of less flexible fabric and rubber.

5. A substantially cylindrical expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end, the body of said member being made of flexible rubber and the ends of said member being of less flexible fabric and rubber;

4 such rejection having been based upon the following alleged prior art:

U. S. patent No.	1,727,474	Madarasz	Sept. 10, 1929,
U. S. patent No.	1,790,206,	Farmer,	Jan. 27, 1931,
French patent No.	19,483,	Samain et al, addition of 1914.	

Appeal was thereupon duly taken by the plaintiffs to the Board of Appeals, who affirmed the decision of the Primary Examiner, also erroneously, as plaintiffs believe; the Board of Appeals in its decision stating that it was of the opinion that invention was not involved in utilizing tubular elastic members with internal and external flanges, such as shown by the patents to Samain or Madarasz, and as regards claims 4 and 5, the Board relied upon the patent to Farmer, as showing a rubber member having end portions of fabric and rubber. In reaching this conclusion, the Board of Appeals also referred to patent No. 1,389,635 to Dunkle, which was cited in the above mentioned parent application, and stated that this Dunkle patent shows tubular elastic diaphragms "securely clamped at the ends", just as in applicant's pump. Plaintiffs aver, however, that the patent to Dunkle does not disclose tubular elastic diaphragms clamped at their ends to fixed supports, as in applicant's pump, and that the patent to Farmer does not disclose the structure defined in claims 4 and 5. Plaintiffs further point out that neither of the patents to Samain and Madarasz relate to pumping devices, but are from a non-analogous art, and, moreover, do not show an elastic tubular member clamped at its ends to fixed supports.

On information and belief, plaintiffs aver that the slush pump made in accordance with the teachings of the above identified parent application was the first pump of this type to achieve any substantial commercial success, and that this success is due largely to the improved construction of elastic pumping member claimed in the present divisional application. Plaintiffs' pump has been
5 widely and successfully used commercially, and has
been found to completely overcome the many and real difficulties encountered in the use of prior art devices, and to possess the most outstanding practical advantages.

A duly certified copy of the file wrapper and contents, as including said divisional application, showing the Patent Office proceedings and the said decision of the Board of Appeals, as well as duly certified copies of the aforesaid alleged prior art patents, will be produced in Court as your Honors may direct.

7. Under the provisions of said Act of March 2, 1927, the said decision of the Board of Appeals of the Patent Office constitutes a refusal by the Commissioner of Patents to grant a patent on said invention as defined by said claims 1 to 5 inclusive, and no appeal has been taken from the decision of the Board of Appeals to the Court of Appeals of the District of Columbia and no such appeal is pending or has been decided. The decision of the Board of Appeals was delivered on or about March 3, 1934, and within the six months last passed, and notwithstanding the said decision of the Board of Appeals, the plaintiff, Stephens Pump Company, is entitled to receive a patent for the improvement aforesaid constituting the subject matter of said claims.

WHEREFORE, the plaintiffs pray the court:

First, to adjudge and decree that the plaintiff, Charles D. Stephens, is the true, first, original and sole inventor of the improvements set forth in the said claims 1 to 5 inclusive hereinabove recited.

Second, to adjudge and decree that plaintiff, Stephens Pump Company, as assignee of said invention, is entitled according to law to receive a patent for the invention specified in and covered by said claims 1 to 5 inclusive or for any part thereof, as the facts in the case may appear.

6 Third, to authorize and direct the Commissioner of Patents to issue to Stephens Pump Company, Letters Patent of the United States as assignee thereof, embodying said claims 1 to 5 inclusive, upon the filing in the Patent Office of such adjudication and upon compliance with the requirements of law in such cases made and provided.

Fourth, that the plaintiffs have a writ of subpoena ad respondendum of the United States of America directed to said Conway P. Coe, as Commissioner of Patents, commanding him on a day certain therein to be named to appear and answer to this bill of complaint, but not under oath, an answer under oath being expressly waived, and to abide by and perform all and singular such orders and decrees in the premises as to this court shall seem proper and conformable to the principles of equity and good conscience; and that plaintiffs have such other and further relief as may be just and proper.

STEPHENS PUMP COMPANY, and
CHARLES D. STEPHENS,

By STONE, BOYDEN & MACK,
Their Attorneys.

J. VINCENT MARTIN.
J. HANSON BOYDEN.
Of Counsel.

DISTRICT OF COLUMBIA, *ss:*

J. Hanson Boyden, being duly sworn, deposes and says that he is a member of the Bar of the Supreme Court of the District of Columbia, is a member of the firm of Stone, Boyden & Mack, and is attorney for the plaintiffs, Stephens Pump Company and Charles D. Stephens, in the foregoing bill of complaint; that the said plaintiff is absent from the District of Columbia and resides in Texas; that he has read the said bill of complaint and knows the contents thereof and he verily believes the facts therein
7 to be true.

J. HANSON BOYDEN—

Subscribed and sworn to before me this 30th day of August, 1934.

CATHERINE S. WILSON
[SEAL] *Notary Public, D. C.*

Answer to the Bill of Complaint.

Filed September 7- 1934

* * * * * * * *

To the Honorable
The Judges of the Supreme Court
of the District of Columbia.

Conway P. Coe, Commissioner of Patents, defendant herein, in answer to the Bill of Complaint alleges on information and belief as follows:

1. He admits the allegations of citizenship and residence of the parties to this suit and that the principal place of business of plaintiff, Stephens Pump Company, is at Round Rock, Texas.

2. He admits the allegation of jurisdiction under Section 4915 R. S.; 35 U.S.C.A. 63, as amended.

3. He admits that Charles D. Stephens, on January 18, 1930, filed an application for letters patent, to which application Serial No. 421,651 was given and in which application the applicant made averments substantially as set forth in paragraph 3 but defendant denies that these averments will support the allowance of the claims for which plaintiffs contend.

4. He admits that Charles D. Stephens, on August 3, 1931, filed an application for letters patent to which Serial
No. 554,740 was given and which is stated to be a
8 division of the earlier application No. 421,651.

5. He admits the allegation of assignment.

6. He admits that claims 1 to 5, recited in paragraph 6, were rejected by the primary examiner, that appeal was taken to the Board of Appeals, and that the Board of Appeals in a decision rendered March 3, 1934, affirmed the decision of the examiner. Defendant denies that the tribunals of the Patent Office erred in refusing to allow said claims 1 to 5, inclusive, as these claims are held to be unpatentable over the following prior patents:

Madarasz,	1,727,474,	Sept. 10, 1929,
Farmer,	1,790,206,	Jan. 27, 1931,
Samain et al. French,	19,483,	of 1915.

Profert of copies of these patents is hereby made.

7. He admits that plaintiffs have been refused a patent but denies that they are entitled thereto, as more fully appears from the statement of the examiner and the decision of the Board of Appeals, copies of which will be presented at the hearing.

FURTHER ANSWERING defendant denies each and every allegation of the Bill of Complaint not herein specifically and sufficiently denied or admitted, and prays that plaintiff's Bill of Complaint be dismissed.

WHEREFORE defendant having fully answered the Bill of Complaint denies that plaintiffs are entitled to the relief demanded or any part thereof and prays that the Bill be dismissed with all costs of the proceedings against the plaintiffs as provided in Section 4915 R. S.

CONWAY P. COE
Commissioner of Patents,
Defendant.

T. A. HOSTETLER,
Solicitor of the U. S.
Patent Office.

District of Columbia,
9 *City of Washington, ss:*

I, Conway P. Coe, Commissioner of Patents, depose and say that I have read the above answer by me subscribed and know the contents thereof, and that the statements of facts therein made as upon personal knowledge are true, and those made upon information and belief I believe to be true.

CONWAY P. COE
Commissioner of Patents.

Subscribed and sworn to before me this 7th day of September, 1934

ALBERT W. KAISER
(SEAL) *Notary Public, D. C.*

My commission expires March 21, 1938.

Memorandum of Court.

Filed November 11 1935

* * * * * * * * *

I think the reasoning of the Board of Appeals is sound, that the application for a patent was properly denied, and that, therefore, the bill must be dismissed.

ALFRED A. WHEAT--
Chief Justice.

November 9, 1935.

Findings of Fact and Conclusions of Law

Filed December 9 1935

* * * * * * * * *

Findings of Fact.

1. The application of Charles D. Stephens, Serial No. 554,740, discloses a tubular diaphragm to be used in a pump, the diaphragm being so associated with the piston of the pump as to prevent the fluid being pumped coming into contact with the piston. This diaphragm has an internal annular flange at one end and an external flange at the other. The body of the diaphragm is made of flexible rubber and the flanges of less flexible fabric and rubber.

2. The patent to Madarasz, No. 1,727,474, discloses an automobile tire gauge having therein a rubber tube formed with an internal flange at one end and an external flange at the other and so connected to the parts of the gauge as to expand and contract under changes of pressure.

3. The French patent to Samain et al., No. 19,483, discloses a cut-off valve in which a tublar member formed of rubber and having an internal flange at one end and an external flange at the other is so connected to the parts of the device as to contract and expand under changes of pressure.

4. The patent to Farmer, No. 1,790,206, discloses a flexible diaphragm having reinforcements at the part thereof which is subjected to the greatest flexing.

5. The patent to Dunkle, No. 1,389,635, shows a diaphragm pump having the diaphragm so arranged therein as to prevent the water being pumped from coming into contact with the piston. This diaphragm is of general tubular shape, being closed at one end and the other end connected to the cylinder in which the piston moves.

Conclusions of Law.

1. Claims 1, 2, 3, 4 and 5, of the Charles D. Stephens' application No. 554,740, involved in the suit, are unpatentable over the prior patents cited.

2. The diaphragm structures shown in the patents to Madarasz, No. 1,727,474, and Samain et al., French pat-

ent No. 19,483, are in an art analogous to that of
11 the art of pumping.

3. It would not be an act of invention to make a diaphragm for a pump of the exact form shown in the Madarasz patent No. 1,727,474, and the French patent to Samain et al., No. 19,483, nor would there be any further invention in reenforcing the diaphragm in view of the Farmer patent, No. 1,790,206.

ALFRED A. WHEAT—
Chief Justice.

December 9, 1935.

Final Decree.

Filed December 9 1935

* * * * * * * * *

This cause having come on to be heard and having been tried in open court and argued by counsel for the respective parties upon the pleadings and proofs adduced and submitted to the Court,

It is ADJUDGED, ORDERED and DECREED this 9th day of December, 1935, that the Bill of Complaint in this case be, and the same hereby is dismissed with costs against the plaintiff.

ALFRED A. WHEAT—
Chief Justice.

Approved as to form:

J. HANSON BOYDEN
Attorney for Plaintiffs.

From the foregoing decree the plaintiffs, Stephens Pump Company and Charles D. Stephens, in open court on the date named above, note an appeal to the United States Court of Appeals for the District of Columbia, and the Court fixes the cost bond on said appeal in the sum of $100, or in lieu thereof, the sum of $50 in cash to be deposited with the Clerk of this Court.

ALFRED A WHEAT—
Chief Justice.

12 *Memorandum*

December 27—1935.
$50 deposit in lieu of bond on appeal.

Assignment of Errors

Filed December 27 1935

* * * * * * * * *

Now came Stephens Pump Company and Charles D. Stephens the above named plaintiffs, by their attorney, J. Hanson Boyden, and, having noted an appeal to the Court of Appeals of the District of Columbia from the final decree and order made and entered in this cause on the 9th day of December, 1935, say that said decree and order are erroneous and unjust and against the rights of said plaintiffs, and, as Assignment of Errors therein represent that said Supreme Court of the District of Columbia erred in the following particulars:

1. In basing the decree wholly on the findings of fact and conclusions of law submitted by defendant.

2. In failing to take cognizance of the points brought out in the testimony, and embodied in the findings of fact submitted by plaintiffs.

3. In failing to find that the hollow, expansible pumping member, on which a patent is sought, is not shown in the prior patents from the pump art.

4. In not holding that the references relied upon by the Patent Office, namely the U. S. patent No. 1,727,474 to Madarasz and the French patent No. 19,483 to Samain et al. are from an entirely non-analogous art.

5. In failing to hold that the Board of Appeals erred in rejecting the patent application on such non-analogous art.

6. In failing to find that neither of the above patents shows a hollow member which expands when in use.

13 7. In not holding that the structure of Dunkle patent No. 1,389,635, is practically inoperative for the purposes intended, as set forth in the testimony.

8. In failing to recognize the notable commercial success which plaintiffs have achieved in a field where others have failed.

9. In dismissing plaintiffs' bill and not sustaining the same.

Wherefore the plaintiffs pray that the said decree be reversed, and that plaintiffs be adjudged entitled to the patent for which application has been made.

J. HANSON BOYDEN—
Attorney for Plaintiffs.

Washington, D. C., December 27, 1935.

Supreme Court of the District of Columbia

Saturday, January 4, 1936

The Court resumes its session pursuant to adjournment, Mr. Justice Luhring, presiding.
As of Jan. 3

* * * * * * * * *

Come now the parties hereto by their respective attorneys of record, and thereupon, the plaintiffs by their attorney present to the Court their Statement of Evidence taken at the trial of this cause, and pray that the same be signed and made of record, nunc pro tunc, which is hereby accordingly done.

ALFRED A. WHEAT,
Chief Justice.

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14 *Docket Entries*

* * * * * * * * *

Date			*Proceedings*	
1934	Aug	31	Deposit of costs by Boyden: 10—	
”	”	”	Bill & Appearance	filed
”	”	”	Subpoena to answer and copy issued.— Ret. Served—8/31/34	
”	Sept.	7	Answer of deft. to bill—App. Hostetler	
”	Dec.	4	Calendared Per Order of Plaintiff's Attorney	”
1935.	Nov.	4	Argued & Submitted	Wheat C. J.
”	”	5	Motion of deft for security for costs (consent)	”
“	“	5	Security for costs ordered in 20 days, 100 bond or $50.00 cash	

Date			*Proceedings*	
1935	Nov.	11	Memorandum of Court dismissing bill. Wheat C. J.	filed
”	”	12	Deposit by J. H. Boyden for plff. as security for costs: 50—	
”	Dec	9	Findings of Fact & Conclusions of Law	
”	”	”	Final decree dismissing bill with costs. Appeal Noted. Wheat C. J.	”
”	”	27	Deposit by J. H. Boyden for plff. in lieu of bond on appeal: 50—	
”	”	”	Deposit by J. H. Boyden: 5—	
”	”	”	Assignment of Errors	filed
1936	Jan	3	Proposed statement of Evidence & stipulation	”
”	”	”	Statement of Evidence signed in duplicate	”
”	”	7	Designation of record	”

Designation of Record

Filed January 7—1936

* * * * * * * * *

Now come Stephens Pump Company and Charles D. Stephens, the appellants in the above entitled cause, and designate the parts of the record which they desire to have included in the transcript, said parts being considered sufficient for the determination of the questions raised on appeal, namely:

1. Docket Entries.
2. Bill of Complaint.
3. Answer
4. Statement of Evidence, and stipulation attached thereto.
5. Copy of Findings of Fact and Conclusions of Law as adopted by the court.

15 6. Decree and notice of appeal.

7. The following exhibits:

(a) Stephens patent No. 1,832,258.

(b) Plaintiffs' Exhibit No. 1, comprising certified copy of the application, the decision of the Board of Appeals, the Examiner's Statement, etc.

(c) Plaintiffs' Exhibit No. 2, the same being an actual sample of the rubber sleeve on which patent is sought.

(d) Plaintiff's Exhibit No. 3, comprising a drawing of "Fluid Piston Slush Pump".

(e) Plaintiffs' Exhibit No. 4, i.e., Stephens patent No. 1,848,441.

(f) Plaintiffs' Exhibit No. 5, comprising a blue print showing licensee's present design of pump.

(g) Plaintiffs' Exhibit No. 6, comprising photographs of an actual pump.

(h) Plaintiffs' Exhibit No. 7, i.e. Tennant patent No. 1,888,053.

8. Defendant's Exhibits, including: U. S. patent No. 1,727,474, to Madarasz. French patent No. 19,483, to Samain et al., together with a translation thereof. U. S. patent No. 1,389,635, to Dunkle. U. S. patent No. 1,790,206, to Farmer.

9. Order approving Statement of Evidence.

10. Assignments of Error.

11. This Designation of the Record, and Stipulation appended thereto.

12. Clerk's Certificate.

By

J. HANSON BOYDEN—
Of Counsel.

Stipulation.

It is this 6th day of January, 1936, hereby stipulated and agreed between the parties hereto, by their respective attorneys, that the transcript on appeal shall comprise those parts of the original proceedings and 16 exhibits as are set forth in the foregoing Designation of the Record, to which this stipulation is appended.

And it is further stipulated that the physical exhibits, including charts, drawings, blue prints, photographs and the actual sample rubber sleeve, forming part of the Statement of Evidence, may remain in the custody of counsel until the hearing, and that the paper exhibits referred to in the Designation of the Record may be printed and/or bound as a part of the record on appeal, to follow the Statement of Evidence.

J. HANSON BOYDEN—
Of counsel for Plaintiffs.

R. F. WHITEHEAD
Of counsel for Defendant.

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17 Supreme Court of the District of Columbia.

UNITED STATES OF AMERICA,
District of Columbia, ss:

I, FRANK E. CUNNINGHAM, Clerk of the Supreme Court of the District of Columbia, hereby certify the foregoing pages numbered from 1 to 16, both inclusive, to be a true and correct transcript of the record, according to directions of counsel herein filed, copy of which is made part of this transcript, in cause No. 57650 in Equity, wherein Stephens Pump Company and Charles D. Stephens are Plaintiffs and Conway P. Coe, Commissioner of Patents, is Defendant, as the same remains upon the files and of record in said Court.

IN TESTIMONY WHEREOF, I hereunto subscribe my name and affix the seal of said Court, at the City of Washington, in said District, this 3rd day of April, 1936.

FRANK E. CUNNINGHAM,
(SEAL) *Clerk.*
By CHAS. B. COFLIN,
Assistant Clerk.

18 In the Supreme Court of the District of Columbia.

In Equity No. 57,650.

STEPHENS PUMP COMPANY AND CHARLES D. STEPHENS,
Plaintiffs,

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS, *Defendant.*

Statement of Evidence.

BE IT REMEMBERED that the above entitled cause came on for trial upon the issues framed by the pleadings, on Monday, November 4, 1935, Mr. Chief Justice Alfred A. Wheat, presiding.

Appearances.

On behalf of the Commissioner of Patents:
R. F. Whitehead, Esq.
On behalf of the Plaintiffs:
J. Hanson Boyden, Esq.

Thereupon, counsel for the Commissioner of Patents handed the Court a folder containing the "complete file" of proceedings in the Patent Office, and counsel for the Plaintiffs offered in evidence a certified copy of the application filed by Plaintiffs, the decision of the Board of Appeals, and the Examiner's statement, etc., which latter were received in evidence as Plaintiffs' Exhibit No. 1. Upon query by the Court, counsel explained briefly the nature and purpose of the suit, and submitted for the Court's examination a copy of the text of Sec. 4915 R. S., on which
19 the suit is founded.

Counsel for Plaintiffs then briefly outlined the procedure in the Patent Office which led up to the filing of this bill.

Counsel next went on to explain the general nature of diaphragm pumps and their advantage over the ordinary kind of pump, such advantage consisting chiefly in the fact that by the use of a diaphragm, corrosive or abrasive liquids being pumped are kept out of contact with the working parts of the pump. He pointed out that what the plaintiff Stephens invented was a novel form of rubber diaphragm.

Counsel called the Court's attention to a large chart or reproduction of the patent application drawings, on which chart the actuating liquid and the liquid to be pumped had been colored red and blue respectively, for the sake of clearness, and explained in general the construction and operation of the pump illustrated in those drawings, pointing out that the liquid is pumped by the contraction and expansion of the rubber diaphragms.

Counsel for the Commissioner of Patents then called attention to paper "D" in the file which he had previously handed the Court, and pointed out that a patent has been granted on the "pump as a whole", as shown in the first two sheets of drawings, while in Figure 3 is illustrated the tubular diaphragm which solely is here in issue. Counsel also explained that the alleged point of novelty is the in-turned and out-turned flanges at the ends of this tubular diaphragm.

Counsel for the Commissioner also called atten-
20 tion to the patent to Madarasz, "marked 'A' in the
folder", and stated that although for an automatic
gauge, this patent shows "a rubber diaphragm of exactly the same kind", with in-turned and out-turned flanges, and that it yields under pressure. He further referred to "a French patent" in the folder, which he said showed a similar diaphragm, but relates to a "pressure controlled valve", and to a patent to Farmer, which he stated was merely cited to show a reinforcement of a diaphragm.

Counsel for the Commissioner further pointed out that the position of the Patent Office was that there was no invention in substituting the diaphragm of Madarasz or the French Patent for the diaphragm of the Dunkle patent, which is the "same generic type of diaphragm".

Counsel for Plaintiffs then called as a witness Mr. Joseph A. Tennant.

Testimony.

Mr. Tennant, after having been first duly sworn, testifying in response to questions by counsel, stated as follows:

That his name is **Joseph A. Tennant**, residing at Houston, Texas, and that he has been a consulting engineer, and is a manufacturer of oil field equipment.

That he is vice-president and general manager of Abercrombie Pump Co., exclusive licensees of the Stephens Pump Company, for the manufacture of slush pumps under the Stephens patents.

That he has an academic degree from the University of Texas, and an engineering degree from the Massachusetts Institute of Technology.

That he is familiar with the so-called "parent"
21 Stephens patent No. 1,832,258, of which the present
case is a division; that he is personally familiar with
the details of the pumps manufactured by his company, and

has been in entire charge of the development work, shop tests, and field tests; that the pumps manufactured by his company contain an expansible rubber sleeve (or diaphragm) such as above discussed, and shown in the present patent application.

The witness then produced an actual sample of such a rubber sleeve or diaphragm, which was offered in evidence, and received as

—Plaintiffs' Exhibit No. 2.—

The in-turned and out-turned flanges on this sample diaphragm were pointed out to the Court, and counsel read claim 1 of the patent application to the Court, and stated that the provision of in-turned and out-turned flanges of this kind was new in the pumping art.

After counsel pointed out that the flanges are less flexible than the body of the tubular diaphragm, and called attention to the fact that some of the claims contain this limitation, the witness explained the purpose of this. He said it is a question of assembly. The flanges fit into recesses machined in the body of the pump, and pressure applied to them, and if the flanges were not relatively stiff, the rubber would be "squeezed out", and a tight seal would not be produced.

In response to further questions by counsel, witness stated that besides the pump construction shown in the parent Stephens patent above referred to, his company
22 had used this identical form of rubber diaphragm or sleeve in "two or three other different types of structures". One was what might be called the second model of his pump, in its course of development, and is shown in the drawing, "Fluid Piston Slush Pump", offered in evidence and received as

—Plaintiffs' Exhibit No. 3.—

The witness pointed out, in this drawing, the rubber tubular diaphragms A and B, having the in-turned and out-turned flanges X and Y, and stated that these diaphragms were practically the same as the actual sample previously introduced.

The witness further stated that he was familiar with another Stephens patent, namely, No. 1,848,441, and that this also is one of the patents under which his company is licensed. A copy of this patent was then introduced in evidence as

—Plaintiffs' Exhibit No. 4.—

and the witness pointed out that it, too, employed the same type of rubber sleeves or diaphragms as are here in issue, these being shown at 4 and 10 in Fig. 1 of the patent drawing.

In response to queries by the Court, the witness then explained the difference in construction between the pumps shown in the two Stephens patents introduced in evidence, pointing out that the first is a piston type, the piston being indicated by the numeral 5, while the second is a plunger type of pump, and discussed at some length the operation of these pumps.

Under continued questioning of counsel, the witness stated that his present design of pump, which also employs the same rubber diaphragm, is again quite different from the two Stephens patents. It is shown in a blue print offered and received in evidence as

—Plaintiffs' Exhibit No. 5.—

23 On this blue print the witness pointed out the reference characters A and B, designating the rubber diaphragms, and X and Y indicating the in-turned and out-turned flanges, and explained that the chief differences of the pump structure over the Stephens patents relate to questions of installation and easy removal of these tubular rubber diaphragms or pumping members.

Referring to the U. S. patent to Madarasz and the French patent to Samain, cited by the Patent Office, the witness said that he was familiar with them; that the rubber member or sleeve in the Madarasz patent is indicated at 16, but that it can never expand, because it is surrounded by a metal sleeve 18; and that he does not find in this patent any mention or description of any flanges.

The witness further explained that in the patent to Samain, the rubber member or sleeve apparently relied upon is indicated by 89 in Fig. 2 of the drawing, but that this sleeve can never expand when in use, because it is surrounded by a coil spring 91, which prevents it from bulging out or expanding. It is merely to prevent leakage. The translation of the text of this French patent does not mention flanges at all.

Witness then went on to state that there is nothing in either of these patents that suggests the use of such a rubber sleeve in a pumping apparatus, or suggests that the flanges are less flexible than the body; in fact, that there is no requirement for expansion of the body.

So far as relative size is concerned, the witness called attention to the fact that the Madarasz patent covers a little pocket size tire gauge, and that the Samain patent relates to a pressure-regulating device, which does
24 not have to be and usually is not very large, while, on the other hand, the rubber sleeve or diaphragm of Plaintiffs is 24 inches long and 11 inches in diameter.

Queried again by the Court, the witness reiterated that neither of the reference patents above discussed is a "pump or pumping apparatus".

To show the large size of the pumping apparatus as built by his Company under the Stephens patents, the witness produced photographs of an actual pump just constructed. These were introduced in evidence as

—Plaintiffs' Exhibit No. 6.—

The witness stated that this pump weighs 16,000 pounds, and was tested to a working pressure of 6,000 per square inch; that pumps of this character are principally used for "pumping mud" in the oil fields; that drilling wells 10,000 feet deep and using working pressures up to 3,000 pounds per square inch are not uncommon, and that a pump often has to work 24 hours a day for anywhere from two weeks to five or six months.

Taking up again the references cited by the Patent Office, the witness said that he was familiar with Dunkle patent (No. 1,389,635), showing a diaphragm type of pump, that 11 in Fig. 1 is the diaphragm, "shaped like a paper bag", closed at one end, and having no flanges at all; and that the Stephens diaphragm, on the contrary, is open at both ends, and has an external flange at one end and an internal flange at the other.

Asked what he regarded as the chief advantages of the Stephens tubular pumping member or diaphragm over the Dunkle diaphragm, the witness replied that "Stephens' will work'' while Dunkle ''will not work'' at all. (The Court remarked that this ''is a decided advantage''.)

25 The witness then went on to explain that he had found from experience that a diaphragm that is not rigidly anchored at both ends ''will not function'', because the unanchored end floats or is carried by the fluid flow against and into the discharge valve opening, and seals off such opening; that then, as the stroke of the plunger is continued, the immense pressure which builds up blows the diaphragm out through the discharge opening, and punctures a hole in it; and that he guesses that ''we lost 75 to 100 diaphragms'', blown out through the discharge port, before he learned the necessary shape to make it.

The witness then identified himself as the patentee of patent No. 1,888,053, Tennant, and explained that the improvement covered by this patent is making the rubber sleeve or diaphragm thicker on one side than the other, which construction tends to help prevent the diaphragm from being blown out of the discharge opening, as above described. A copy of this Tennant patent was introduced in evidence as

—Plaintiffs' Exhibit No. 7,''

and counsel for Plaintiffs pointed out that the reason for offering this patent was because the claims are identical in form with those which Plaintiffs are now seeking.

No cross-examination.

Witness excused.

In closing, counsel for the Commissioner of Patents stated that there was no dispute about the facts involved, and the Court expressed the same opinion. Counsel for Plaintiffs, however, did not admit this.

26 Whereupon, the trial of the case was concluded.

Be it further remembered that the foregoing contains the substance of all of the evidence given on the hearing of this cause, and this Statement of Evidence is duly stated, approved and signed, and ordered to be made of record in the above entitled cause this 3rd day of January, 1936.

By the Court:

ALFRED A. WHEAT,
Chief Justice.

27 In the Supreme Court of the District of Columbia.

No. 57,650 In Equity.

Stephens Pump Company and Charles D. Stephens,
Plaintiffs,
vs.
Conway P. Coe, Commissioner of Patents, *Defendant.*

Stipulation.

It is hereby stipulated and agreed that the Statement of Evidence as prepared by the plaintiff and attached hereto, service and receipt of a copy of which is acknowledged by the defendant, shall constitute the Statement of Evidence for the purpose of this appeal and that the same may be received without further amendment, defendant hereby consenting to the immediate approval of said Statement of Evidence by the court, and hereby waiving the period allowed under the rules in which to make objection and/or present amendments.

J. HANSON BOYDEN,
Of Counsel for Plaintiffs.
R. F. WHITEHEAD,
Of Counsel for Defendant.

(Here follows Exhibit 8, marked 28 to 34.)

35 Stephens Pump Co. *et al vs.* Coe

Equity No. 57,650
Plaintiffs Exhibit 1
390

Department of Commerce
United States Patent Office

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of the Petition, Specification, Oath and Drawings, as originally filed; and Papers 2, 4, 6, 7, 8 and 12, in the matter of the

Pending Application of
Charles D. Stephens,
Filed August 3, 1931, Serial Number 554,740,
for
Improvement in Pumping Members.

In Testimony Whereof I have hereunto set my hand and

Nov. 17, 1931. C. D. STEPHENS 1,832,258

PUMP

Filed Jan. 18, 1930 3 Sheets-Sheet 1

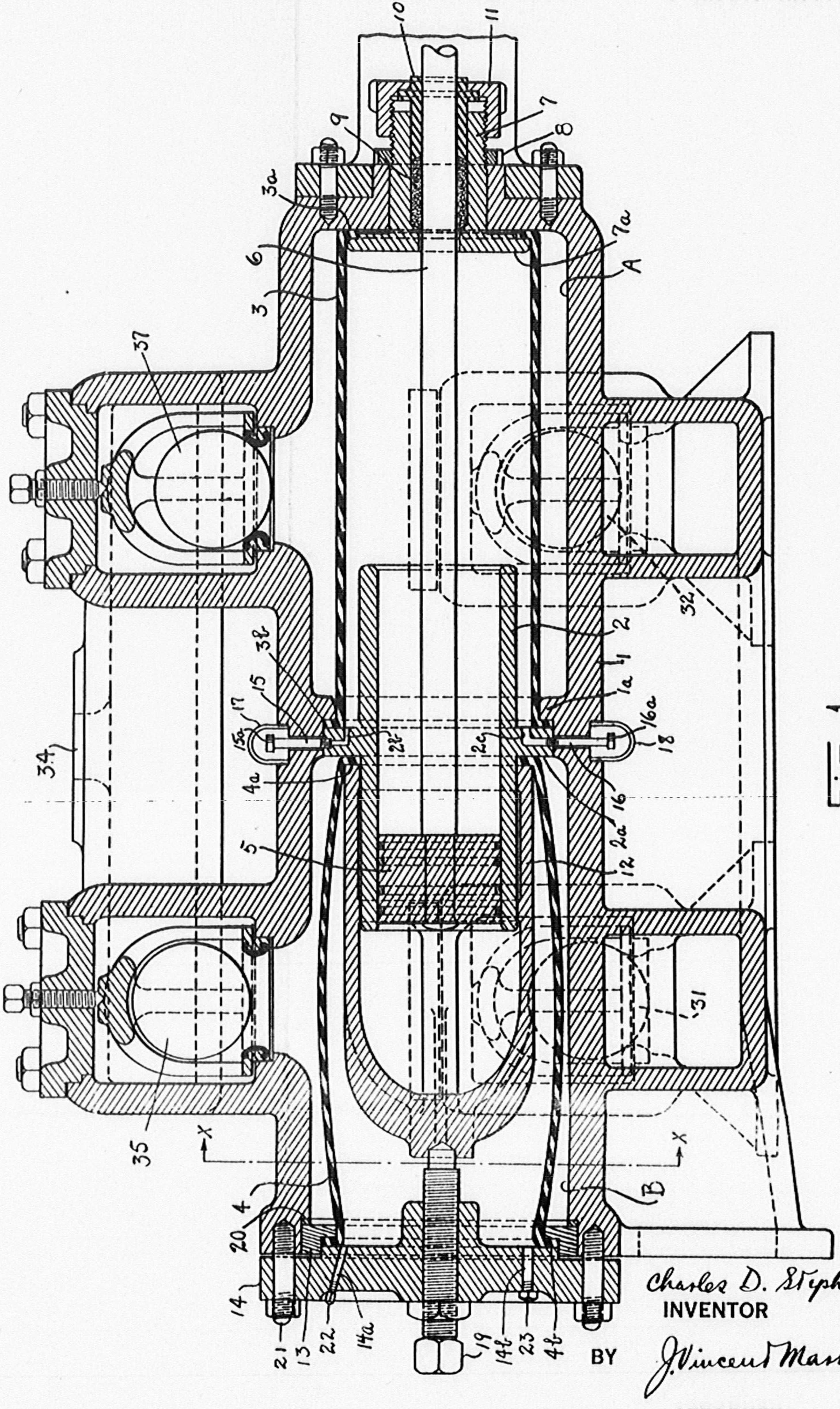

Fig. 1

Charles D. Stephens
INVENTOR

BY J. Vincent Martin

ATTORNEY

25

Nov. 17, 1931. C. D. STEPHENS **1,832,258**

PUMP

Filed Jan. 18, 1930 3 Sheets-Sheet 2

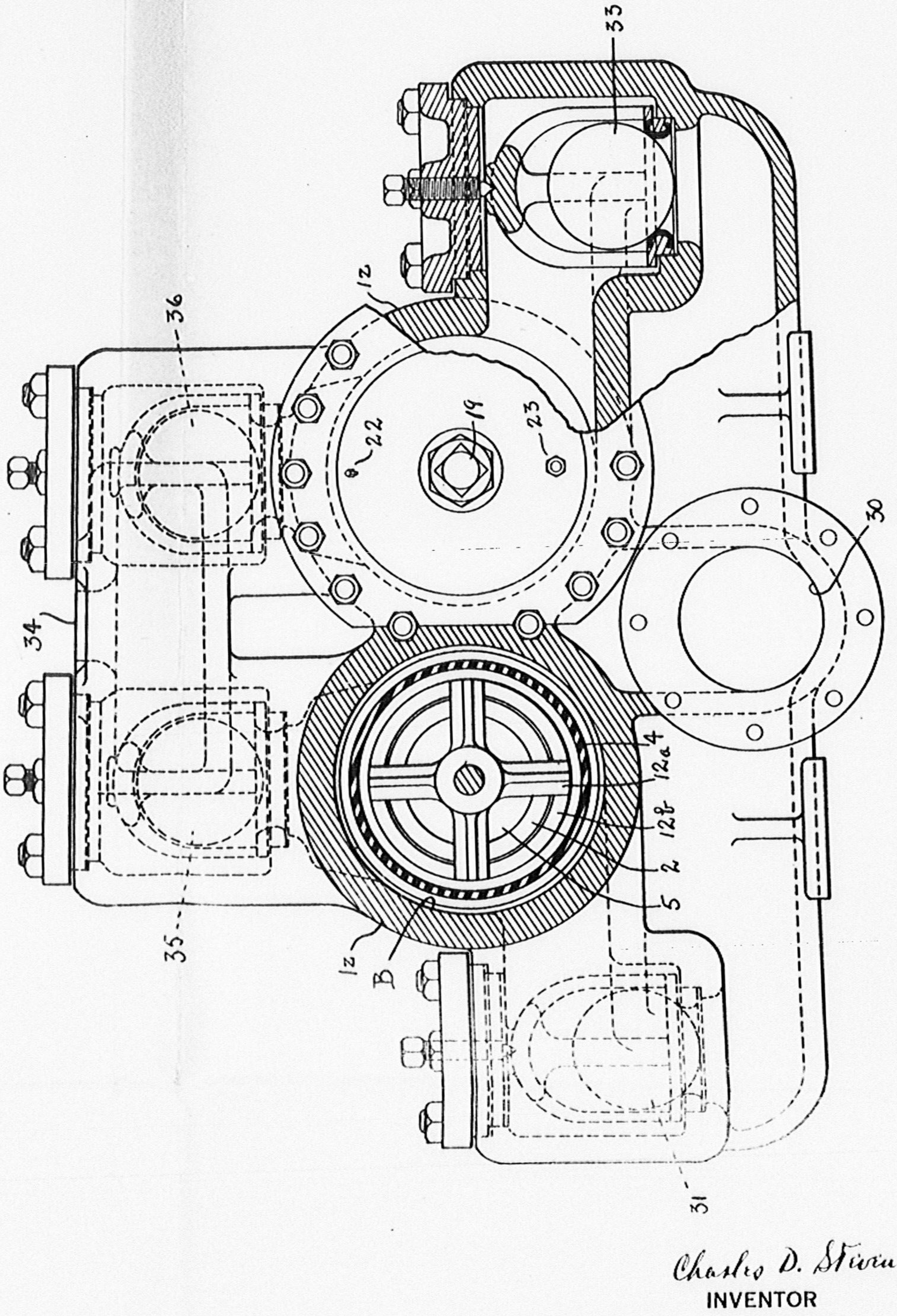

Fig. 2

Charles D. Stevens
INVENTOR

BY J. Vincent Martin

ATTORNEY

26

Nov. 17, 1931. C. D. STEPHENS **1,832,258**

PUMP

Filed Jan. 18, 1930 3 Sheets-Sheet 3

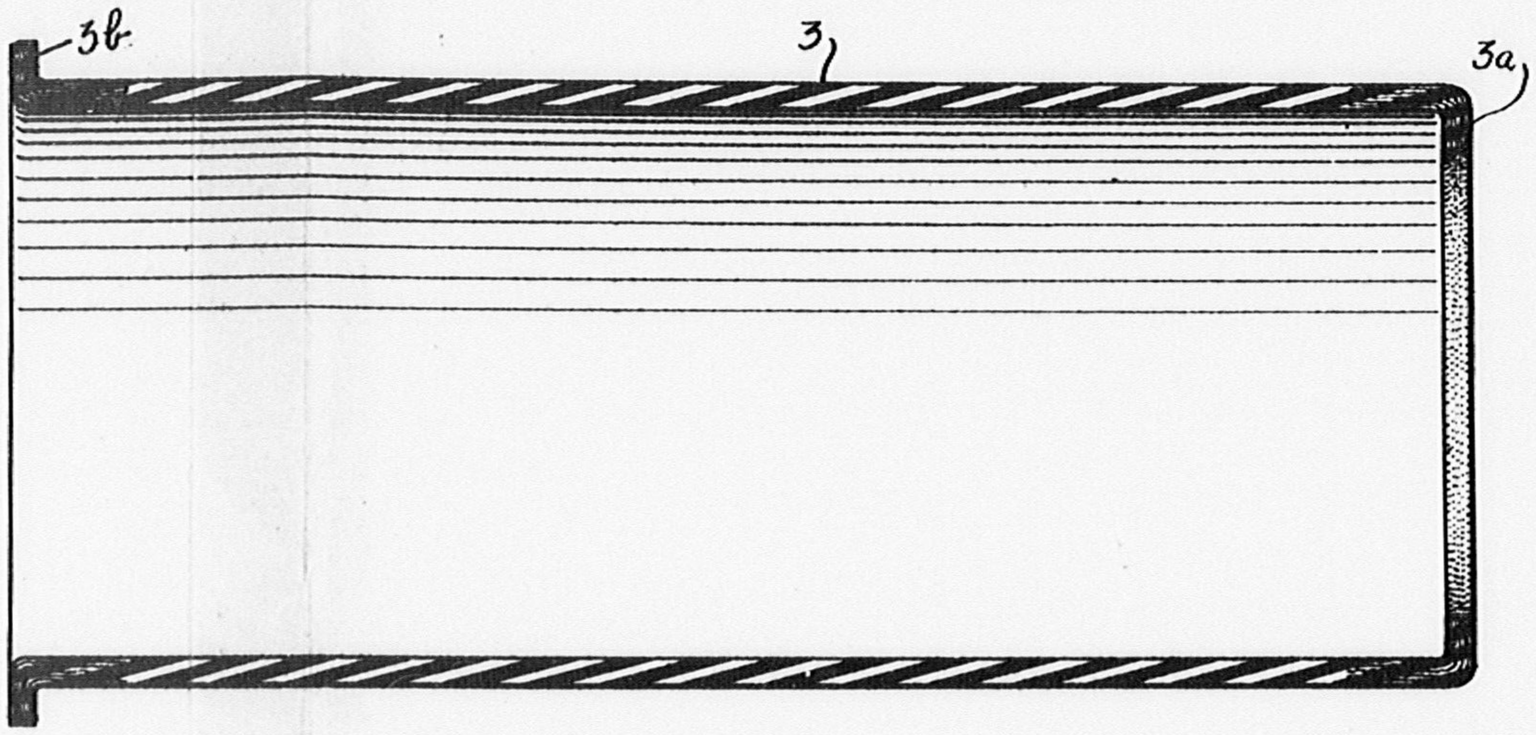

Fig. 3

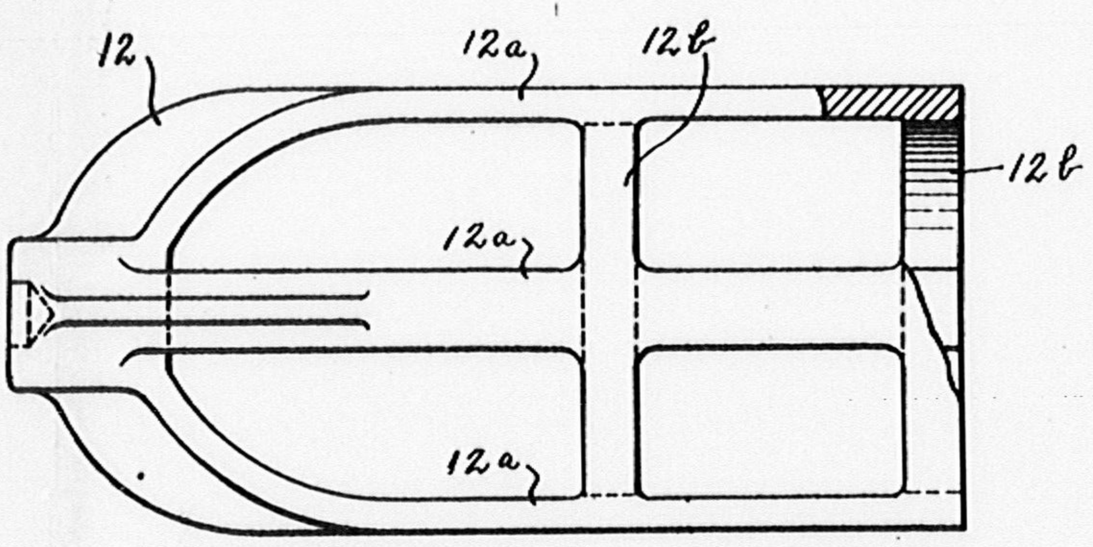

Fig. 4

Charles D. Stephens
INVENTOR

BY J. Vincent Martin
ATTORNEY

Patented Nov. 17, 1931 **1,832,258**

UNITED STATES PATENT OFFICE

CHARLES D. STEPHENS, OF SAN ANTONIO, TEXAS, ASSIGNOR TO STEPHENS PUMP COMPANY, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE

PUMP

Application filed January 18, 1930. Serial No. 421,651.

This invention relates to pumps of the type shown by my pending application for Letters Patent of the United States, filed May 15, 1929, Serial No. 363,213; that is, pumps designed for pumping abrasive and corrosive fluids.

The general object of the present invention is the provision of a pump particularly adapted for pumping slush in rotary deep well drilling, but capable of efficient performance in various other fields; embodying a piston and a cylinder, and new and improved means to keep the pumped fluid out of contact with the same.

A more specific object of the invention is to provide for pumps of this character a new and improved expansible hollow member to be operatively associated with the pump piston and to prevent the pumped fluid from coming into contact therewith.

Another specific object is the provision of a new and improved mounting for said member.

A further object is to provide a new and improved arrangement of a pair of such members, means to actuate the same, and means whereby they may quickly and easily be mounted in and removed from the pump casing.

Various other objects will hereinafter appear.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a vertical sectional view of a pump; Fig. 2, an end view in which one of the inlet valve assemblies is shown in section and a portion of the casing is removed as indicated by the line x—x of Fig. 1; Fig. 3, a detail view of the expansible member; and Fig. 4, a detail view of the member support.

The pump shown embodies a casing 1 having twin cylindrical portions 1z, in each of which is mounted a working cylinder, a piston, and a pair of expansible members.

The casing is provided with a common intake port 30 communicating with the chambers A and B within each of the cylindrical portions 1z of the casing. Between the chambers A and B and the port 30 are four intake valves, three of which are shown (31, 32, and 33). The casing is also provided with a common exhaust port 34 communicating with the cylinders 1z, and four exhaust valves, three of which are shown (35, 36, and 37).

The set of elements in one of the cylindrical portions 1z being identical in construction and function to that within the other, a description of but one set will now be given.

Centrally disposed in and spaced from the internal walls of the cylindrical portion 1z is the working cylinder 2; and reciprocable within the cylinder 2 is the piston 5. The normally cylindrical expansible members 3 and 4 are mounted, respectively, in chambers A and B.

It will be observed that the cylinder 2, and expansible members 3 and 4 are axially aligned.

The cylinder 2 has an external annular flange 2*a* fitting adjacent the internal annular flange 1*a* of the casing.

The member 3 has an internal annular flange 3*a* at its outer end which is compressed by and held between the head 7*a* of the clamp 7 and the end wall of the casing. The clamp 7 is held by the nut 8 on the exterior of the casing. The inner end of this sleeve has an external annular flange 3*b* which is held by and compressed between the internal flange 1*a* of the casing and the external flange 2*a* of the cylinder.

The inner end of the sleeve 4 has an internal annular flange 4*a* compressed by and held between the external flange 2*a* of the cylinder and the inner end of the support 12. The outer end of the sleeve 4 has an external annular flange 4*b* compressed by and held between the ring 13 and the casing head 14.

The bodies of these members are preferably made of flexible rubber; the flanges, of less flexible fabric and rubber.

The piston rod 6 extends outwardly through the clamp 7 which is internally recessed for the reception of the packing 9 compressed by the gland 10 and nut 11.

The flange 2*a* of the cylinder is provided with oppositely disposed ducts 2*b* and 2*c* in communication with the tubes 15 and 16, respectively. These tubes are capped as indicated at 15*a* and 16*a* and covered by hollow plugs 17 and 18. Actuating fluid is supplied therethrough to the sleeve 3 as hereinafter explained.

The support 12 (Fig. 4) has four legs 12*a* and two spaced rings 12*b* one of which is at the extremities of said legs. The adjacent end of the cylinder 2 snugly fits in said rings. Fitting within the socket in the outer end of the support 12 is the set screw 19 by which the member 12 is made to compress and hold the flange 4*a* of the sleeve. This set screw 19 is carried by the casing head 14.

A sealing gasket 20 is interposed between the casing 1 and ring 13, as shown.

The casing head 14 is secured to the casing by suitable bolts 21 and is provided with apertures 14*a* and 14*b* closed by the removable plugs 22 and 23. By means of these apertures actuating fluid is supplied to the expansible member 4.

The parts may be assembled as follows:

The clamp 7 is placed within the inner end of the member 3. The member 3 and clamp 7 are then inserted through chamber B into chamber A, to the positions shown by Fig. 1, whereupon the nut 8 is tightened. It will be observed that the flange 3*a* of this member is thereby held in sealing contact with the casing and that the flange 3*b* rests upon the flange 1*a* of the casing.

The cylinder 2 is then inserted through the chamber B until its flange 2*a* rests upon the flange 3*b* of the expansible member 3; and the piston 5 and its rod 6 are then placed in the cylinder 2 and clamp 7, respectively. Packing 9, gland 10, and nut 11 are then placed as shown by Fig. 1.

The ring 13 is then placed upon the member 4; the support 12, within said member. The three are thereupon inserted so that the rings 12*b* slide upon the cylinder 2 and the flange 4*a* is carried into contact with the flange 2*a* and the ring 13 into engagement with the gasket 20.

The casing head 14 carrying the set screw 19 is then bolted on the end of the casing. The flange 4*b* of the expansible member 4 and the gasket 20 are thereby compressed. The cage 12 is then moved by the set screw 19 to compress the flange 4*a* of the expansible member 4 and the flange 3*b* of the expansible member 3.

The piston being in the position shown by Fig. 1, the plugs 17 and 18 and the caps 15*a* and 16*a* are removed, and an actuating fluid, preferably castor oil, is pumped into the sleeve 3 until it appears at the tube 15. The caps 15*a* and 16*a* and the plugs 17 and 18 are then replaced.

The piston is then moved to the right end of the cylinder. The plugs 22 and 23 are then removed, and oil is pumped through the lower aperture in the head 14 until it appears at the upper aperture, at which time the plugs 22 and 23 are replaced.

The pump is then ready for operation.

It will be apparent to those skilled in the art that the assembly of the parts may be effected in various ways other than that just described. Attention is invited particularly to the fact that the expansible members 3 and 4 are sealed by means exterior of the casing; and that such means may be employed to simultaneously seal said members.

The operation of the pump may briefly be outlined as follows:

As shown by Fig. 1, when the piston is at its forward position the member 4 is expanded; the member 3, in its normal cylindrical shape. Now when the power means, not shown, moves the piston on its return stroke, the member 3 is expanded by the actuating fluid forced therein, and the member 4 contracted by the withdrawal of actuating fluid therefrom. Upon expansion of member 3, the inlet valve 32 is closed; the outlet valve 37, opened; and the fluid in the chamber A is forced through the exhaust port 34. Meanwhile, the contraction of the member 4 has closed outlet valve 35, opened inlet valve 31, and drawn a fresh charge of fluid through the intake port 30 into the chamber B.

A reverse operation occurs upon forward movement of the piston. The piston forces actuating fluid into the member 4 and draws it from the member 3. Consequent expansion of member 4 effects closure of inlet valve 31, opening of valve 35, and expulsion of fluid from the chamber B through the exhaust port 34. Simultaneous contraction of member 3 effects closure of outlet valve 37, opening of inlet valve 32, and suction of fluid through intake port 30 into chamber A.

The alternate expansion and contraction of the expansible members 3 and 4 is radial, and not axial.

The invention is not limited to the preferred embodiments shown. Various changes may be made within the scope of the following claims:

I claim:

1. In a pump, a casing having two chambers, a cylinder between said chambers, a piston reciprocable in said cylinder, an expansible hollow fluid-tight member in each of said chambers and communicating with said cylinder, said cylinder, piston, and members being substantially in axial alignment.

2. In a pump, a casing having two chambers, a cylinder between said chambers, a piston reciprocable in said cylinder, a substantially cylindrical expansible hollow fluid-tight member in each of said chambers and communicating with said cylinder, said cylinder, piston, and members being substantially in axial alignment.

3. In a pump, a casing having two chambers, a cylinder between said chambers, a piston in said cylinder, and a hollow expansible member in each of said chambers, each

of said members having an inner end communicating with and connected and sealed to said cylinder and in axial alignment therewith, the outer ends of said members being closed.

4. In a pump, a casing having a chamber, a removable cylinder in said casing, said cylinder having an open end, a piston reciprocable in said cylinder, and an expansible hollow fluid-tight member in said chamber and having an open end clamped between said cylinder and casing adjacent the open end of said cylinder.

5. In a pump, a casing having a chamber, a removable cylinder in said casing, said cylinder having an open end, a piston reciprocable in said cylinder, and an expansible hollow fluid-tight member in said chamber and having an open end into which the open end of said cylinder extends, the open end of said member being clamped between said cylinder and casing.

6. In a pump, a casing having a chamber, a cylinder in said casing, said cylinder having an open end, a piston reciprocable in said cylinder, an expansible hollow fluid-tight member in said chamber and having an open end into which the open end of said cylinder extends, and a support adjustable from the exterior of said casing to clamp the open end of said member between said cylinder and said support to seal and hold the same.

7. In a pump, a casing having a pair of chambers, a removable cylinder between said chambers, said cylinder being open at each end, a piston reciprocable in said cylinder, an expansible hollow fluid-tight member in one of said chambers and having an open end into which one end of said cylinder extends, the said open end of said member extending between said cylinder and said casing, an expansible hollow fluid-tight member in the other of said chambers and having an open end into which the other end of said cylinder extends, and a support adjustable from the exterior of the casing to clamp the open end of the first-mentioned member between said cylinder and said casing, and the open end of the last-mentioned member between said cylinder and said support, to seal and hold the ends of said members.

8. For pumps of the character described, a cylinder having a central external annular flange, said flange having fluid ducts therein.

9. In a pump of the character described, a casing, a pair of expansible hollow members in said casing, and means adjustable from the exterior of said casing to simultaneously seal one end of each of said members.

10. In a pump of the character described, a casing, an expansible hollow member in said casing, and means to simultaneously seal one end of said casing, and one end of said member.

11. In a pump, a casing having a pair of chambers, a cylinder between said chambers, a piston reciprocable in said cylinder, and a hollow expansible fluid-tight member in each of said chambers and communicating with said cylinder, said cylinder, piston, and members being insertible in and removable from said casing through a single opening adjacent one of said chambers.

12. In a pump, a casing having a pair of chambers, a cylinder between said chambers, a piston reciprocable in said cylinder, a hollow expansible fluid-tight member in each of said chambers and communicating with said cylinder, and means adjustable from the exterior of said casing for supporting and sealing said cylinder and members.

13. In a pump: a pair of chambers; inlet and outlet means associated with said chambers; a substantially cylindrical expansible hollow member in each of said chambers, said members being axially aligned and having open ends adjacent each other; and a piston reciprocable adjacent the open ends of said members to cause the expansion and contraction of said members to draw fluid into said chambers through said inlet means and to force it out of said chambers through said outlet means.

14. In a pump: a pair of chambers; inlet and outlet means associated with said chambers; a cylinder between said chambers; a piston reciprocable in said cylinder; an expansible hollow fluid-tight member in each of said chambers and communicating with said cylinder, said cylinder, piston, and members being substantially in axial alignment; said piston serving to cause the expansion and contraction of said members to draw fluid into said chambers through said inlet means and to force it out of said chambers through said outlet means.

In testimony whereof, I hereunto affix my signature.

CHARLES D. STEPHENS.

caused the seal of the Patent Office to be affixed, at the City of Washington, this twenty-ninth day of October, in the year of our Lord one thousand nine hundred and thirty-five and of the Independence of the United States of America the one hundred and sixtieth.

(Seal)

Attest:
C. W. SUTTON,
Acting Chief of Division.

CONWAY P. COE,
Commissioner of Patents.

Mail Division
36 AUG -3 31
U. S. Patent Office

554740

Petition

To the Commissioner of Patents:

Your Petitioner, Charles D. Stephens, a citizen of the United States, and a resident of San Antonio, in the County of Bexar, and State of Texas, whose Post Office Address is Box 1265, San Antonio, Texas, prays that Letters Patent may be granted to him for the improvement in PUMPING MEMBERS, set forth in the annexed specification; and he hereby appoints J. Vincent Martin, whose Post Office Address is Niels Esperson Building, Houston, Texas, his attorney, with full power of substitution and revocation, to prosecute this Application, to make alterations and amendments therein, to receive the Patent, and to transact all business in the United States Patent Office connected therewith.

Signed at Houston, in the City of Harris, and State of Texas, this 30th day of July, 1931.

CHARLES D. STEPHENS.

Specification

To all whom it may concern:

Be it known that I, Charles D. Stephens, a citizen of the United States, residing at San Antonio, in the County of Bexar, and State of Texas, have invented new and useful

PUMPING MEMBERS, of which the following is a specification:

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37 This invention relates to expansible members for pumps of the character covered by my pending application for Letters Patent of the United States, filed January 18, 1930, Serial No. 421,651, of which the present application is a division.

A specific object of the present invention is to provide for pumps of this character a new and improved expansible member to be operatively associated with the pump piston and to prevent the pumped fluid from coming into contact therewith.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a vertical sectional view of a pump; Fig. 2, an end view in which one of the inlet valve assemblies is shown in section and a portion of the casing is removed as indicated by the line x-x of Fig 1; Fig. 3, a detail view of the expansible member; and Fig. 4, a detail view of the member support.

The pump shown embodies a casing 1 having twin cylindrical portions 1z, in each of which is mounted a working cylinder, a piston, and a pair of expansible members.

The casing is provided with a common intake port 30 communicating with the chambers A and B within each of the cylindrical portions 1z of the casing. Between the chambers A and B and the port 30 are four intake valves, three of which are shown (31, 32, and 33). The casing is also provided with a common exhaust port 34 communicating with the cylinders 1z, and four exhaust valves, three of which are shown (35, 36 and 37).

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38 The set of elements in one of the cylindrical portions 1z being identical in construction and function to that within the other, a description of but one set will now be given.

Centrally disposed in and spaced from the internal walls of the cylindrical portion 1z is the working cylinder 2; and reciprocable within the cylinder 2 is the piston 5. The normally cylindrical expansible members 3 and 4 are mounted, respectively, in chambers A and B.

It will be observed that the cylinder 2, and expansible members 3 and 4 are axially aligned.

The cylinder 2 has an external annular flange 2a fitting adjacent the internal annular flange 1a of the casing.

The member 3 has an internal annular flange 3a at its outer end which is compressed by and held between the head 7a of the clamp 7 and the end wall of the casing. The clamp 7 is held by the nut 8 on the exterior of the casing. The inner end of this sleeve has an external annular flange 3b which is held by and compressed between the internal flange 1a of the casing and the external flange 2a of the cylinder.

The inner end of the sleeve 4 has an internal annular flange 4a compressed by and held between the external flange 2a of the cylinder and the inner end of the support 12. The outer end of the sleeve 4 has an external annular flange 4b compressed by and held between the ring 13 and the casing head 14.

The bodies of these members are preferably made of flexible rubber; the flanges, of less flexible fabric and rubber.

The piston rod 6 extends outwardly through the clamp 7 which is internally recessed for the reception of the packing 9 compressed by the gland 10 and nut 11.

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39 The flange 2a of the cylinder is provided with oppositely disposed ducts 2b and 2c in communication with the tubes 15 and 16, respectively. These tubes are capped as indicated at 15a and 16a and covered by hollow plugs 17 and 18. Actuating fluid is supplied therethrough to the sleeve 3 as hereinafter explained.

The support 12 (Fig. 4) has four legs 12a and two spaced rings 12b one of which is at the extremities of said legs. The adjacent end of the cylinder 2 snugly fits in said rings. Fitting within the socket in the outer end of the support 12 is the set screw 19 by which the member 12 is made to compress and hold the flange 4a of the sleeve. This set screw 19 is carried by the casing head 14.

A sealing gasket 20 is interposed between the casing 1 and ring 13, as shown.

The casing head 14 is secured to the casing by suitable bolts 21 and is provided with apertures 14a and 14b closed by the removable plugs 22 and 23. By means of these apertures actuating fluid is supplied to the expansible member 4.

The parts may be a assembled as follows:

The clamp 7 is placed within the inner end of the member 3. The member 3 and clamp 7 are then inserted through chamber B into chamber A, to the positions shown by Fig. 1, whereupon the nut 8 is tightened. It will be observed that the flange 3a of this member is thereby held in sealing contact with the casing and that the flange 3b rests upon the flange 1a of the casing.

The cylinder 2 is then inserted through the chamber B until its flange 2a rests upon the flange 3b of the expansible member 3; and the piston 5 and its rod 6 are then placed in the cylinder 2 and clamp 7, respectively. Packing 9, gland 10, and nut 11 are then placed as shown by Fig. 1.

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40 The ring 13 is then placed upon the member 4; the support 12, within said member. The three are thereupon inserted so that the rings 12b slide upon the cylinder 2 and the flange 4a is carried into contact with the flange 2a and the ring 13 into engagement with the gasket 20.

The casing head 14 carrying the set screw 19 is then bolted on the end of the casing. The flange 4b of the expansible member 4 and the gasket 20 are thereby compressed. The cage 12 is then moved by the set screw 19 to compress the flange 4a of the expansible member 4 and the flange 3b of the expansible member 3.

The piston being in the position shown by Fig. 1, the plugs 17 and 18 and the caps 15a and 16a are removed, and an actuating fluid, preferably castor oil, is pumped into the sleeve 3 until it appears at the tube 15. The caps 15a and 16a and the plugs 17 and 18 are then replaced.

The piston is then moved to the right end of the cylinder. The plugs 22 and 23 are then removed, and oil is pumped through the lower aperture in the head 14 until it appears at the upper aperture, at which time the plugs 22 and 23 are replaced.

The pump is then ready for operation.

It will be apparent to those skilled in the art that the assembly of the parts may be effected in various ways other than that just described. Attention is invited particularly to the fact that the expansible members 3 and 4 are sealed by means exterior of the casing; and that such means may be employed to simultaneously seal said members.

The operation of the pump may briefly be outlined as follows:

As shown by Fig. 1, when the piston is at its forward position the member 4 is expanded; the member 3, in its normal cylindrical shape. Now when the power means, not

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41 shown, moves the piston on its return stroke, the member 3 is expanded by the actuating fluid forced therein, and the member 4 contracted by the withdrawal of actuating fluid therefrom. Upon expansion of member 3, the inlet valve 32 is closed; the outlet valve 37, opened; and the fluid in the chamber A is forced through the exhaust port 34. Meanwhile, the contraction of the member 4 has closed outlet valve 35, opened inlet valve 31, and drawn a fresh charge of fluid through the intake port 30 into the chamber B.

A reverse operation occurs upon forward movement of the piston. The piston forces actuating fluid into the member 4 and draws it from the member 3. Consequent expansion of member 4 effects closure of inlet valve 31, opening of valve 35, and expulsion of fluid from the chamber B through the exhaust port 34. Simultaneous contraction of member 3 effects closure of outlet valve 37, opening of inlet valve 32, and suction of fluid through intake port 30 into chamber A.

The alternate expansion and contraction of the expansible members 3 and 4 is radial, and not axial.

The invention is not limited to the preferred embodiment shown. Various changes may be made within the scope of the following claims:

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42 I claim:

1. An expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end.

2. A substantially cylindrical expansible hollow pumping member having open ends, an external annular flange at one end, and an internal flange at the other end.

3. A substantially cylindrical expansible hollow pumping member made of rubber and having open ends, an external annular flange at one end, and an internal annular flange at the other end.

4. A substantially cylindrical expansible hollow pumping member, the body of said member being made of flexible

rubber, and the ends of said member being made of less flexible fabric and rubber.

5. A substantially cylindrical expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end, the body of said member being made of flexible rubber and the ends of said member being of less flexible fabric and rubber.

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43 IN TESTIMONY WHEREOF, I hereunto affix my signature.

CHARLES D. STEPHENS.

Oath

STATE OF TEXAS,
County of Harris, ss.:

Charles D. Stephens, the above-named petitioner, being sworn, deposes and says that he is a citizen of the United States, and resident of San Antonio, Texas, that he verily believes himself to be the original, first and sole inventor of the improvement in PUMPING MEMBERS, described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months prior to this application; and that no application for patent on said improvement has been filed by him or his representatives or assigns in any country foreign to the United States.

CHARLES D. STEPHENS.

Sworn to and subscribed before me, this 30th day of July, 1931.

MARGARET O. DOBBS,
Notary Public, Harris Co., Texas.
554740

(Here follow pages marked 44 to 46)

Serial No. 554740

3

14-64-13

U.S. FIG. .... CLASS .... SUB. CLASS

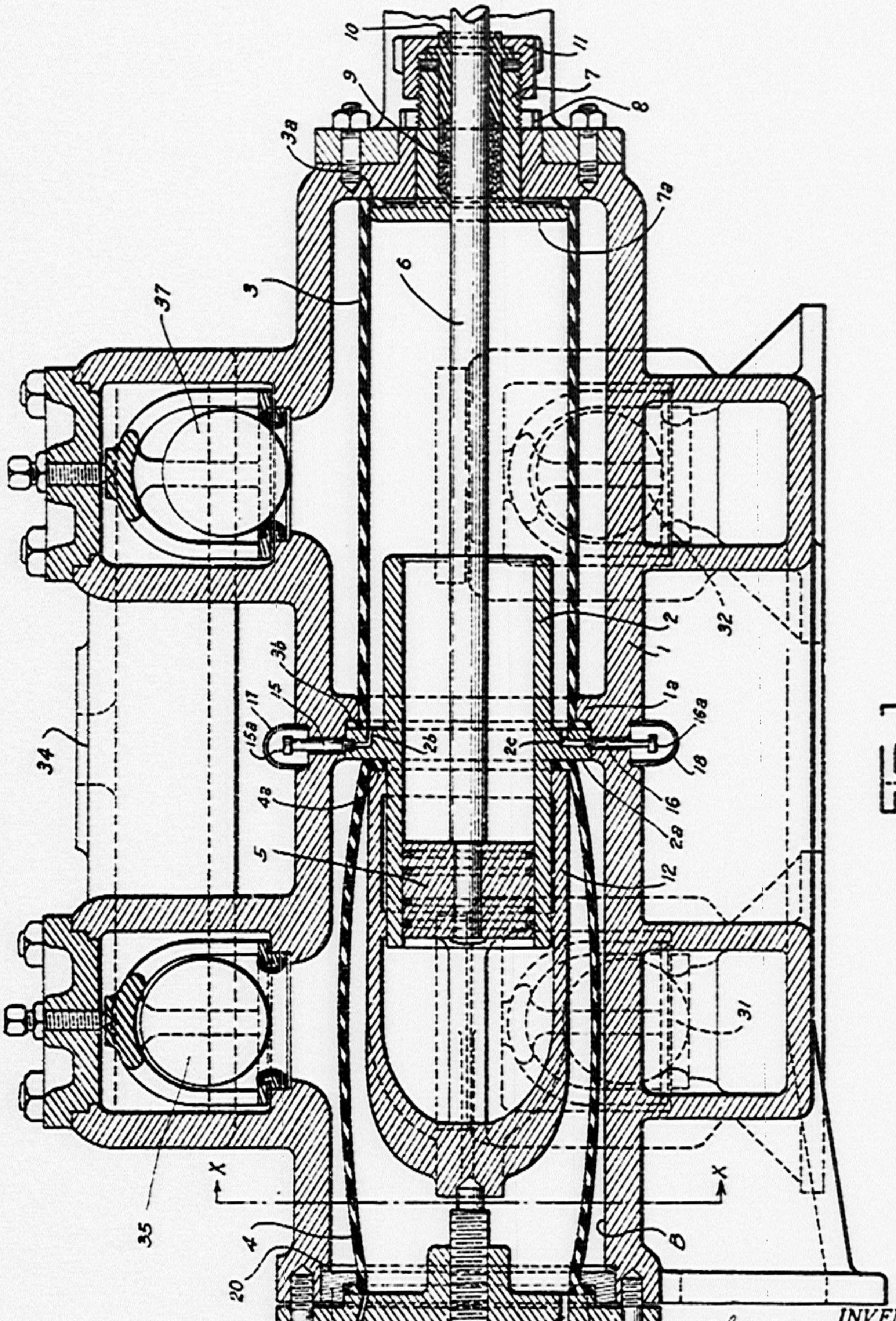

Fig. 1

INVENTOR.
Charles D. Stephens

BY J. Vincent Martin
ATTORNEY.

Serial No. 554740 Div. 39
3 Sheets - Sheet. 2

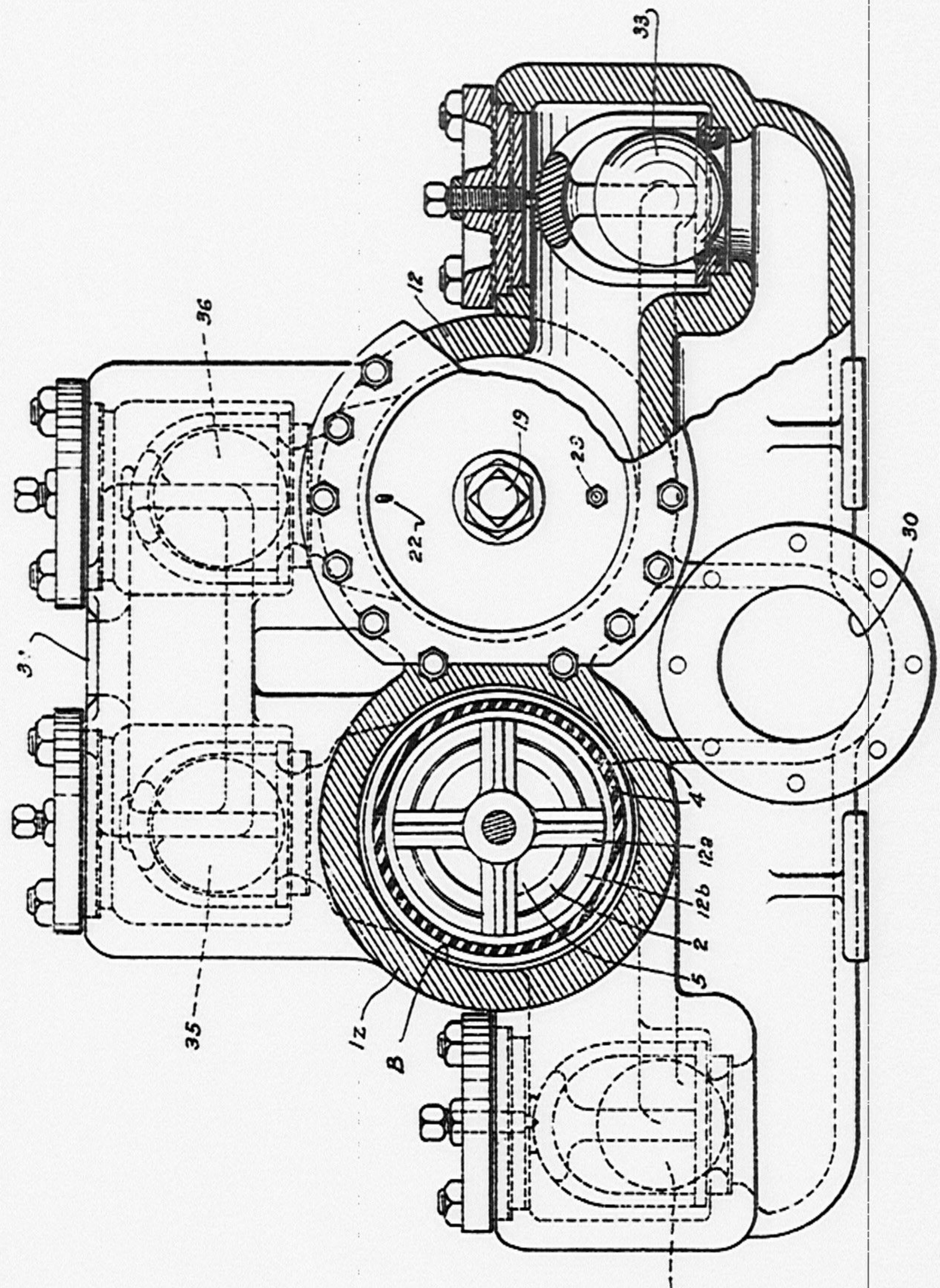

FIG. 2

Charles D. Stephens
INVENTOR.

BY J. Vincent Martin
ATTORNEY.

Serial No. 551740
3 3

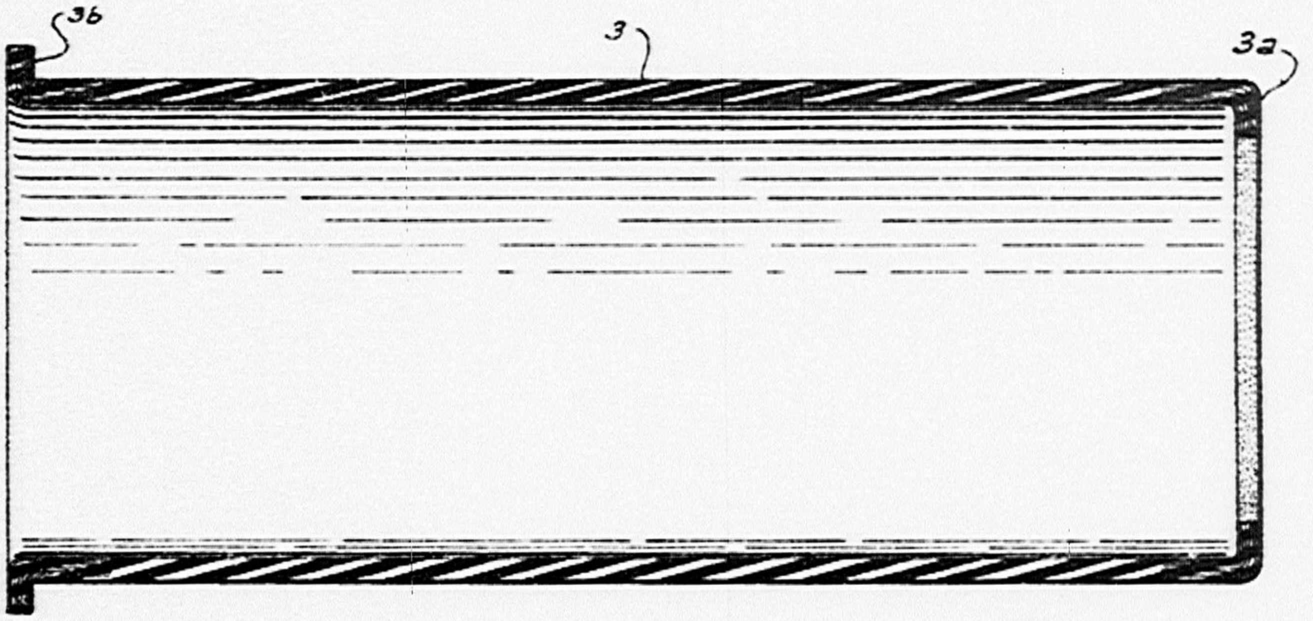

Fig. 3

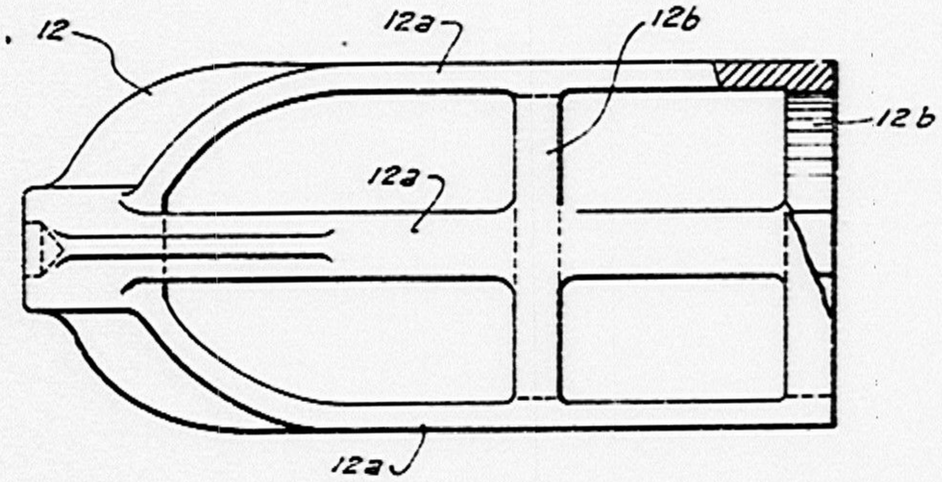

Fig. 4

Charles D. Stephens
INVENTOR.

BY J. Vincent Martin
ATTORNEY.

47 Div. 39; Room 4874; 260; AAT:SA; Paper No. 2

DEPARTMENT OF COMMERCE

United States Patent Office, Washington

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, and name of the applicant.

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON,
Commissioner of Patents

Applicant: Charles D. Stephens; Ser. No. 554740; Filed Aug. 3, 1931 for Pumping Members.

Mailed Feb. 5, 1932.

J. Vincent Martin, Niels Esperson Bldg., Houston, Texas.

This application has been examined.

References cited:

Samain (Fr.)	19,483	addition of 1914	50/21
Madrasz	1,727,474	Sept. 10, 1929	52/4
Farmer	1,790,206	Jan. 27, 1931	137/157

Claims 1-3 are rejected as fully met and directly readable on either Samain or Madarasz.

Claims 4 and 5 are rejected on either Madarasz or Samain. It is common to reinforce rubber diaphragms with fiber and to confine the reinforcement to the clamped portion only would not amount to invention. See the patent to Farmer.

Tomelden

A. W. COWES,
Examiner.

554740

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48 Div. 39; Room 4874; AAT:HM; 260, Paper No. 4

DEPARTMENT OF COMMERCE

United States Patent Office, Washington

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, and name of the applicant.

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON,
Commissioner of Patents

Applicant: Charles D. Stephens; Ser. No. 554740; Filed Aug. 3, 1931 for Pumping Members.

Mailed, July 18, 1932.

J. Vincent Martin, Niels Esperson Bldg., Houston, Texas.

Responsive to communication of July 12, 1932.

The claims stand rejected as of record. The two references cited against the claims are adaptable for use in pumps and are, therefore, capable of being pumping members. If, however, applicant believes to have devised a new pump, he should recite more of the structure of the pump which he has invented.

Tomelden

J. I. WHITNEY,
Acting Examiner.

554740

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49 Div. 39; Room 4874; AT-CS; 260 Paper No. 6.

DEPARTMENT OF COMMERCE

United States Patent Office, Washington

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, and name of the applicant.

Please find below a communication from the Examiner in charge of this application.

THOMAS E. ROBERTSON,
Commissioner of Patents

Applicant: Charles D. Stephens; Ser. No. 554740; Filed Aug. 3, 1931 for Pumping Members.

Mailed, May 9, 1933.

J. Vincent Martin, Niels Esperson Bldg., Houston, Texas.

Responsive to communication filed January 7, 1933.

The rejection of record is repeated. Applicant's arguments have been carefully considered but they are deemed not to bring out anything recited by the claim that would warrant patentability over the rejection of record.

This action is made final under ex parte Miller 150 O. G. 827.

Tomelden

J. I. WHITNEY,
Examiner.

554740

50 Mail Division, Nov. 7, 1933, U. S. Patent Office.

In The United States Patent Office

Nov. 7, 1933, 80308K—Check—$15.00 Ex P. Patent Office.
Paper No. 7; Appeal, Nov. 9, 1933, Division 39.

In the application of Charles D. Stephens, Serial No. 554740; Filed: August 3, 1931, For: Pump.

Appeal to the Board of Appeals

Honorable Commissioner of Patents, Washington, D. C.
Sir:

I hereby appeal to the Board of Appeals from the decision of the Primary Examiner dated May 9, 1933, finally rejecting claims 1 to 5, inclusive, of the above application.

The following are the points of the decision on which the appeal is taken:

1. The Examiner erred in rejecting claims 1 to 3 as fully met and directly readable on either Samain (Fr.) 19,483, or Madrasz 1,727,474.

2. The Examiner erred in rejecting Claims 4 and 5 on either Madrasz 1,727,474 or Samain (Fr.) 19,483, on the ground that it is common to reinforce rubber diaphragms with fiber and to confine the reinforcement to the clamped portion only would not amount to invention, referring to the patent to Farmer 1,790,206.

3. The Examiner erred in rejecting Claims 1 to 5 inclusive, on the ground that Samain (Fr.) 19,483, and Madrasz 1,727,474 are adaptable for use in pumps, and are therefore capable of being pumping members, and in holding that if applicant has devised a new pump that he should recite

more of the structure of the pump which he has invented.

Board of Appeals, Nov. 8, 1933, U. S. Patent Office.

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51 4. The Examiner erred in finally rejecting Claims 1 to 5.

An oral hearing is requested.

The appeal fee of $15.00 check is enclosed herewith.

Respectfully submitted,

CHARLES D. STEPHENS,
By J. Vincent Martin,
Attorney.

Houston, Texas, Dated: November 4, 1933.

554740

52 Div. 39; Room 4874; Paper No. 8

In The United States Patent Office

In re application of Chas. D. Stephens, Serial No. 554,740, Filed: August 3, 1931, For: Pumping Members.

Before the Board of Appeals on appeal.

Mailed Nov. 13, 1933.

Examiner's Statement

This is an appeal from the final rejection of all the claims in this case, namely, claims 1 to 5, inclusive, which may be found in the original papers.

Applicant discloses a so-called pumping member comprising a hollow cylindrical tube 3 as shown in Fig. 3 of the drawings. It is made of rubber. The structural features upon which applicant relies for patentability are the inturned annular flange 32, the out-turned annular flange 3b and the reenforced ends of said tube.

The references relied upon are:

Madarasz	1,727,474	Sept. 10, 1929	50-4
Farmer	1,790,206	Jan. 27, 1931	137-157
Samain etal	19,483	French addition of 1914	50-21

Claims 1 to 3 inclusive have been rejected as fully met and directly readable on either Samain or Madarasz. Applicant's only argument against the rejection is based on the alleged ground that neither Samain or Madarasz comes from analogous art. That member 16 of Madarasz or member 89 of Fig. 2 of the Samain patent could be used as contemplated by applicant seems to be too obvious to require inventive ingenuity on the part of the average mechanic to see. In both the references and the device at bar a cylindrical rubber tube with inturned annular flange at one end and out turned annular flange at the other is shown.

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53 This tube, both in the references as well as in the present device are intended to expand and contract due to fluid pressure in one direction and to an opposing mechanical pressure in the other. It may be true that, because the reference devices are pressure actuated valves whereas applicant contemplates using his tube with a pump, they are slightly non-analogous as to use. It is submitted however, that as far as the tube claimed is concerned, whether it be called a pumping member, or a pressure responsive member, it is merely a tubular diaphragm. Accordingly, it should be reasonable for one claiming a tubular diaphragm, irrespective of how it is used, to expect art from valve actuating diaphragms where the feature relied upon for patentability lies only in the specific structure of the tubular diaphragm.

Claims 4 and 5 have been finally rejected on either Samain et al or Madarasz, no invention being involved in reenforcing the clamped portion of the diaphragm in view of Farmer. Here again applicant objected to the rejection not because of any lack of structure on the references but on the alleged fact that not one of the references is used in the manner contemplated by him. It is submitted that applicant has not invented any thing as far as the structure of the tubular rubber tube is concerned. He has not made any attempt to avoid the structure shown by the references, nor has he pointed out wherein they fail to meet the recitation of the claims. Applicant's only argument lies in the alleged ground of non-analogous art. The fallacy of this ground has been fully discussed in connection with the rejection of claims 1 to 3.

Respectfully,
F. I. WHITNEY,
Examiner, Div. 39.

AAT/LM
Tomelden.

54 Appeal No. 10,487; Paper No. 12, Decision

U. S. Patent Office, Board of Appeals, Mar. 3, 1934, Mailed.

Hearing: Feb. 20, 1934.

In The United States Patent Office

Before the Board of Appeals

Ex parte Charles D. Stephens

Application for Patent filed August 3, 1931, Serial No. 554,740. Pumping Members.

Mr. J. Vincent Martin and Messrs. Stone, Boyden & Mack for applicant.

This is an appeal from the final rejection of claims 1 to 5, inclusive, which are all of the claims in the application.

Claims 1 and 5 are illustrative:—

1. An expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end.

5. A substantially cylindrical expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end, the body of said member being made of flexible rubber and the ends of said member being of less flexible fabric and rubber.

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55 The references relied on by the Examiner are:—

Samain et al. (Fr.)	19,483	of 1915
Madarasz	1,727,474	Sept. 10, 1929
Farmer	1,790,206	Jan. 27, 1931

The appealed claims relate to a flexible member for a pump of the diaphragm type. The application illustrates a complete double acting pump including the diaphragm particularly claimed here. The pump as an organization has been allowed in applicant's prior application, Serial No. 421,651, now Patent No. 1,832,258 dated November 17, 1931. The present application is a division of the prior application.

Briefly, the pump comprises the open ended cylinder 2 having the piston 5 reciprocable therein. The open ends of the cylinder 2 communicate with the tubular rubber mem-

bers 3 and 4 respectively. These rubber members have sealing means at each of their ends comprising the internal flanges 3a and external flanges 3b and internal flanges 4a and external flanges 4b respectively. The end portions and flanges of the rubber cylinders may be of stiffer rubber and reinforced. These flanges are clamped between appropriate clamping means to make a fluid-tight sealing and holding means. The interior of the cylinder and each of the rubber cylinders are filled with some liquid such as castor oil which when the piston 5 is reciprocated causes alternate bulging and contraction of the two cylindrical rubber diaphragms. This automatically causes intake and expulsion respectively in the chambers surrounding the diaphragms at the two ends of the pump through the valve chambers shown. Such mechanism is intended for use in handling abrasive or corrosive liquids which liquids are by this means maintained out of contact with the
554740
56 working surfaces of the cylinder and piston.

The claims presented in this divisional application relate entirely to the tubular rubber diaphragm element. This division was made in compliance with a requirement in the parent case wherein it was held that this diaphragm element is a separate subject of invention from the pump as a whole.

The appealed claims have been rejected upon either Samain et al. or Madarasz supplemented by Farmer as to claims 4 and 5 in respect to reinforcing the ends of the tubular diaphragms with fabric.

Each of Samain et al, and Madarasz discloses tubular rubber fluid confining elements having the shape of the tubular diaphragm elements claimed by applicant. In Samain et al. the element 89 is a tubular rubber element having inturned flange at one end and an outturned flange at the other. In Madarasz the element 16 likewise a tubular rubber element has an internal flange at the upper end and an outturned flange at the lower end. Each of the devices of Samain et al, and Madarasz is an automatic pressure measuring and cutoff valve. In each case the elastic tubular rubber element serves to confine fluid under pressure and to yield to a requisite amount in order to permit the device to close the respective valve members to shut off the flow of fluid when a certain pressure is reached. The rubber elements are provided with the respective internal and external flanges at their ends for the purpose of securely clamping the members in fluid tight relation as in applicant's case.

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It is applicant's contention that fluid pressure reg-
57 ulating valves are not analogous subject matter to
that of pumps and that the use of the tubes 89 and 16 respectively of Samain et al. and Madarasz would not be suggestive of the use of such tubular elements in pumps.

The only features included in claims 1, 2 and 3 are broadly a hollow member having open ends and an internal flange at one end and an external flange at the other. They read directly in structural features on Samain et al. or Madarasz. It is true these claims include reference to this member as being a pumping member but such term is of broad and indefinite scope. It may be taken at most to be only a requirement that the member is to be connected in some fluid-tight manner at its ends. No other requirement is necessary. This is the identical use and purpose of the tubular flanged elements 89 and 16 of Samain et al. and Madarasz respectively. So far as set forth in these claims therefore we regard the terms as not avoiding these references and as being for an analogous use.

If it should however be held that the term pumping member is entitled to more weight in limiting applicant's device strictly to a pump element, it is found that applicant is not the inventor of this type or principle of diaphragm pump. It is found that the patent to Dunkle of record in the parent application illustrates a pump for the same purpose, that is, handling abraisive or corrosive liquids and wherein tubular elastic diaphragms are employed to maintain the motive fluid and another fluid to be pumped, separated. The tubular diaphragms in the Dunkle pump are, as in appli-
cant's pump securely clamped at the ends. In such

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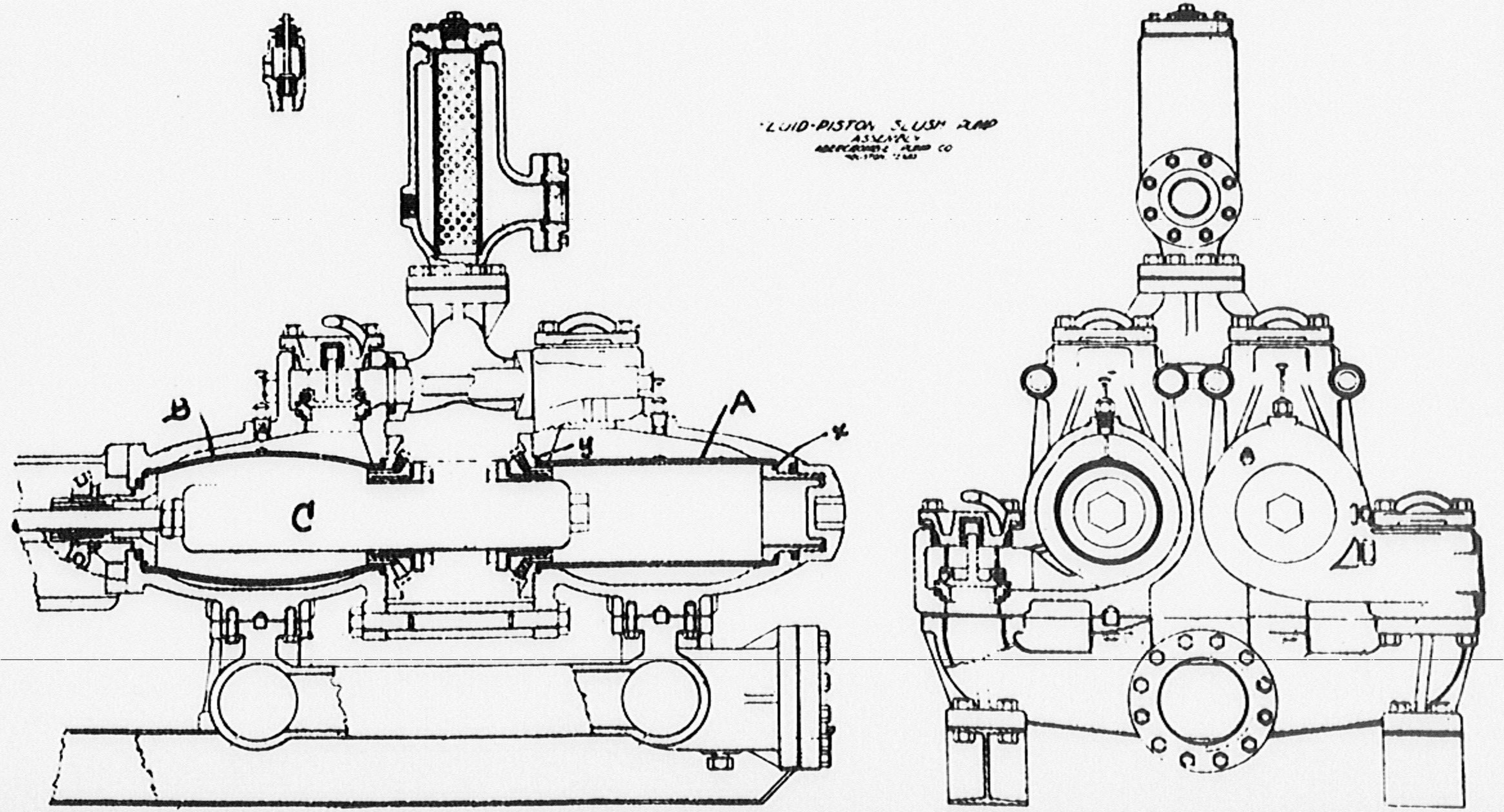
58 circumstances we believe the question presented is
whether one would be entitled to go to the pressure valve art or any other art wherein tubular elastic members are required to be clamped at the ends and adopt any type of joint there found for so attaching the ends of such tubular diaphragm.

Stephens Pump Co. et al. vs Coe
Equity Docket 57650

Plaintiff's Exhibit 3



March 8, 1932. C. D. STEPHENS 1,848,441

PUMP

Filed Aug. 30, 1930

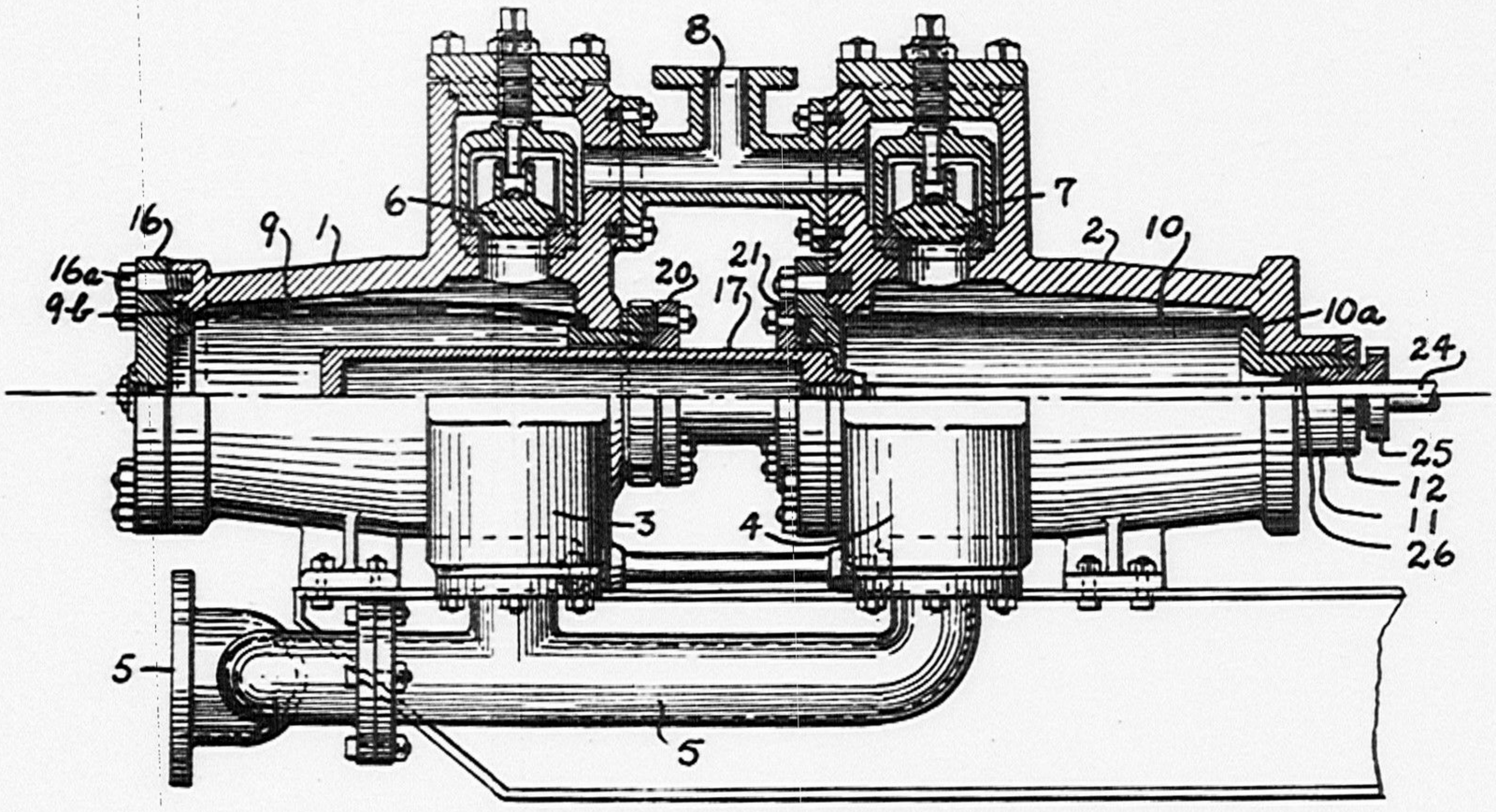


Fig. 1

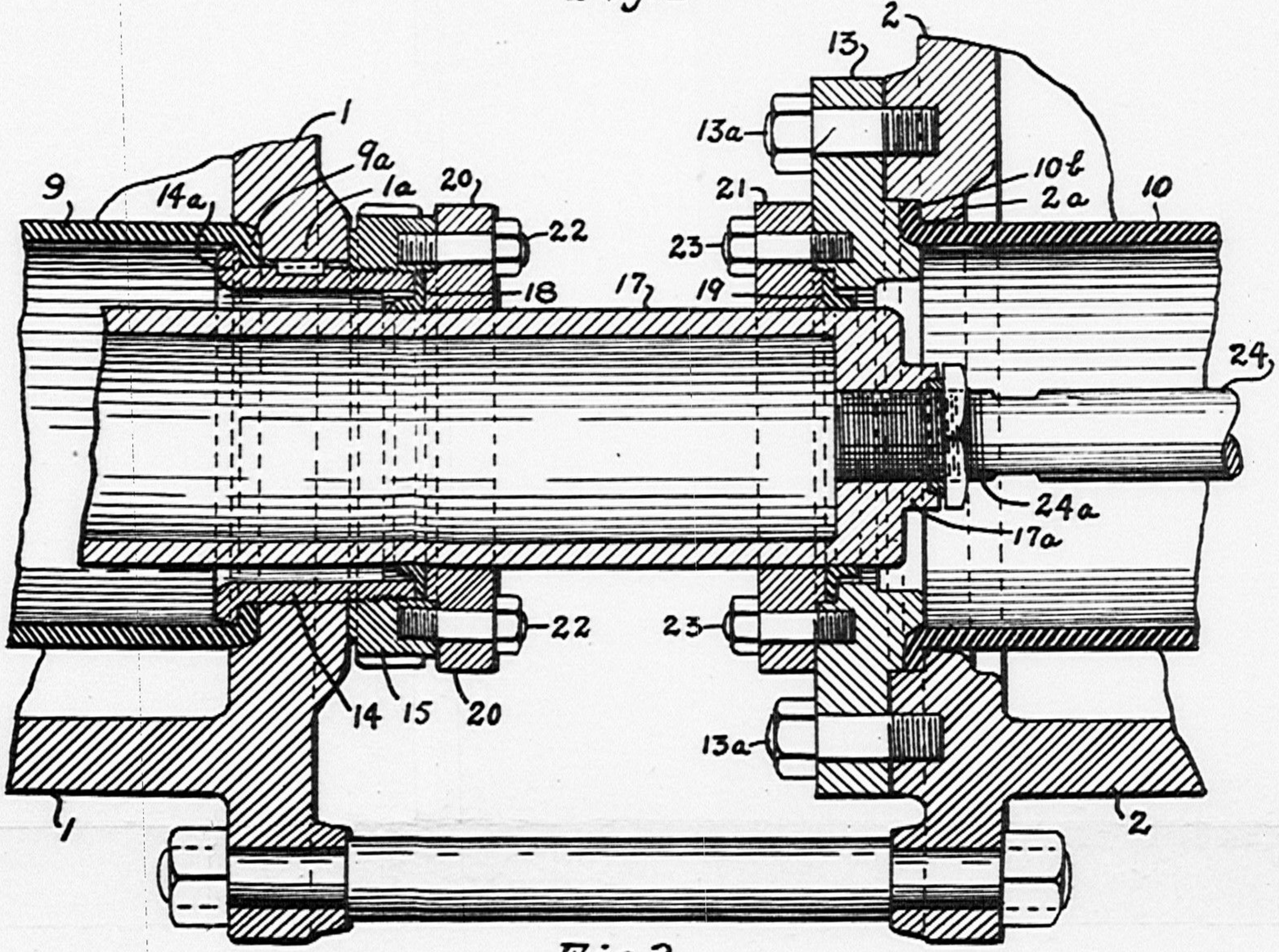


Fig. 2

Charles D. Stephens.
INVENTOR.

by J Vincent Martin
ATTORNEY.

Patented Mar. 8, 1932 **1,848,441**

UNITED STATES PATENT OFFICE

CHARLES D. STEPHENS, OF SAN ANTONIO, TEXAS, ASSIGNOR TO STEPHENS PUMP COMPANY, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE

PUMP

Application filed August 30, 1930. Serial No. 478,878.

This invention relates to pumps.

In my pending application, filed January 18th, 1930, Ser. No. 421,651, Patented Nov. 17, 1931, No. 1,832,258, I have disclosed and claimed a pump of the type hereinafter illustrated embodying hollow expansible members containing fluid actuated by a piston whereby the members are intermittently expanded and permitted to contract to expel the fluid to be pumped from and to draw a new charge thereof into the barrels of the pump in which the members are disposed. At the outset, a predetermined quantity of fluid is placed in each of the expansible members. By-passing of fluid about the piston from one member to the other has resulted in one member having too much fluid therein, the other too little. This invention has for one of its objects the provision of a new and improved pump embodying new and improved means to prevent by-passing of fluid about its piston.

Another object of this invention is to provide a new and improved construction of said barrels to prevent wear of the said members, and to effect a free circulation of the fluid to be pumped.

Other objects will hereinafter appear.

The preferred embodiment of the invention is illustrated by the accompanying drawings, of which Fig. 1 is a partly sectional elevation of the pump; and Fig. 2 is a detail sectional view of the packing means and associated parts.

The pump comprises a pair of substantially frusto-conical barrels 1 and 2 which are spaced and aligned so that their base ends are adjacent each other. The barrel 1 has an intake valve 3 and an exhaust valve 5; the barrel 2, an intake valve 4 and exhaust valve 7. The intake valves 3 and 4 permit the entrance into the barrels of fluid from the common intake pipe 5; and prevent the escape of fluid from the barrels into the intake pipe 5. The exhaust valves 6 and 7 permit the expulsion of fluid from the barrels into the common exhaust pipe 8; and prevent the passage of fluid into the barrels from the exhaust pipe 8.

Mounted within and co-extensive with the barrels 1 and 2 are the normally cylindrical expansible members 9 and 10.

The member 10 has an internal annular flange 10*a* at its outer end which is compressed by and held between the clamp 11 and the outer end wall of the barrel. The clamp 11 is held by the nut 12 on the exterior of the barrel. The inner end of member 10 has an external annular flange 10*b* (Fig. 2) which is held by and compressed between the internal annular flange 2*a*, which defines an opening in the inner end of the barrel 2, and by the member retaining ring 13, which is removably held in place by bolts 13*a*.

The inner end of the member 9 has an internal annular flange 9—*a* (Fig. 2) compressed by and held between the internal annular flange 1*a*, which defines an opening in the inner end of the barrel 1, and by the flange 14*a* of the clamp 14. Engaging the clamp 14 on the exterior of the inner end of barrel 1 is a nut 15. The member 9 has on its outer end (Fig. 1) an external annular flange 9*b* which is compressed between and held by the outer end wall of the barrel 1 and the head 16. The head 16 is removably held in place by the bolts 16*a*.

The new and improved arrangement provided by this invention to prevent by-passing of the actuated fluid about the piston 17 will now be described.

The piston 17 is disposed between and extends into the openings in the adjacent ends of the spaced barrels and the open ends of the members 9 and 10. By-passing of fluid about the piston from one member to the other cannot take place in view of the disposition of the piston; and any leakage may readily be detected. Packing rings 18 and 19, the first of which is compressed between and held by clamp 14 and the ring 20, and the last of which is compressed between and held by the retaining rings 13 and 21, prevent the escape of fluid from the members. These packing rings are substantially L-shaped in cross-section, as shown. The ring 20 is removably held on the nut 15 by the bolts 22; the ring 21 on the ring 13 by bolts 23.

The piston rod 24 is connected to the piston 17 and extends through the expansible member 10 and gland 25 outwardly to the conventional power means not shown. The rod 24 is sealed by the packing 26 compressed by the gland 25.

The members 9 and 10 may be filled with actuating fluid by any suitable means, not shown. For example, ducts may be provided in the head 16 and ring 13. The piston 17 is moved to the right, and the member 9 is then filled. Then the piston is moved to the left and the member 10 is filled.

The members 9 and 10 having been filled with actuating fluid, the operation of the pump is as follows:

As shown by Fig. 1, when the piston is at its forward position the member 9 is expanded; the member 10, in its normal cylindrical shape. Now when the power means, not shown, moves the piston on its return stroke, the member 10 is expanded by the fluid therein displaced by the piston 17 and the member 9 is contracted by the withdrawal of the piston therefrom. Upon expansion of member 10, the inlet valve 4 is closed; the outlet valve 7, opened; and the fluid in barrel 2 forced through the exhaust pipe 8. Meanwhile, the contraction of member 9 has closed outlet valve 6, opened inlet valve 3 and drawn a fresh charge of fluid through the intake valve 5 into the barrel 1.

A reverse operation occurs upon forward movement of the piston. The piston displaces the actuating fluid in the member 9 and withdraws from member 10. Consequent expansion of member 9 effects closure of the inlet valve 3, opening of outlet valve 6, and expulsion of fluid from the barrel 1 through the exhaust pipe 8. Simultaneous contraction of member 10 effects closure of outlet valve 7, opening of inlet valve 4, and suction of fluid through intake pipe 5 into barrel 2.

The alternate expansion and contraction of the expansible members 9 and 10 is radial, and the intake and exhaust ports are in the large or base ends of the barrels, so that there is sufficient clearance between the expansible members and the walls of the barrels adjacent said ports. The expansible members are, therefore, not forced into wearing contact with the barrel walls and a free circulation of the fluid to be pumped is insured.

The packing rings 18 and 19 may readily be removed and replaced without disturbing the connection of the expansible members 9 and 10 to the barrels. This may be accomplished by disconnecting the rod 24 from the power means, not shown, and moving the piston and rod to the left until the connected ends 17*a* and 24*a* thereof are disposed between the barrels. The rod 24 may then be screwed out of the piston 17, the bolts 22 and 23 removed, and the rings 20 and 21 and packing rings 18 and 19 taken away from the pump. New packing rings may then be substituated for the packing rings removed and the other parts remounted.

It will be noted that while the piston packing means may be removed and replaced without disturbing the connection between the barrels and the expansible members, the removable and adjustable parts connecting the latter are accessible from the exterior of the pump.

The invention is not limited to the preferred embodiment herein illustrated. Various changes may be made within the scope of the following claims:

I claim

1. In a pump, a pair of spaced barrels, a hollow expansible member in each of said barrels, a piston between said barrels and extending into said members, and removable packing means in the adjacent ends of said barrels and about said piston.

2. In a pump, a pair of spaced barrels, a hollow expansible member in each of said barrels, a piston between said barrels and extending into said members, a rod connected to said piston, and removable packing means in the adjacent ends of said barrels and about said piston, the connected ends of said piston and rod being movable to a point between said barrels, said piston and rod being then seperable to permit the removal and replacement of said packing means.

3. In a pump, a barrel having an opening therein, a hollow expansible member in said barrel and having an open end adjacent said opening, a piston extending through said opening in said barrel and into said open end of said member, and removable means to connect and seal said end of said member to said barrel and to pack said piston, said means being accessible from the exterior of said barrel.

4. In a pump, a pair of spaced barrels, each of said barrels having an opening in its end adjacent the other of said barrels, a hollow expansible member in each of said barrels and having an open end adjacent the opening in said barrel, a piston between said barrels and extending through said openings in said barrels and into said open ends of said members, and adjustable and removable means to connect and seal said ends of said members to said barrels and to pack said piston in said openings in said barrels, said means being accessible from the exterior of said barrels.

5. A pump having a frusto-conical barrel, an intake port and an exhaust port in the walls of said barrel adjacent the base end thereof, a normally cylindrical expansible member within and co-extensive with said barrel, and means to expand said member.

6. In a pump, a pair of spaced barrels, a hollow expansible member in each of said

barrels, and a piston between said barrels and extending into said members.

7. In a pump, a pair of spaced barrels, inlet and outlet means associated with said barrels, a hollow, expansible member in each of said barrels, a piston between said barrels and extending into said members to cause expansion and contraction of said members to draw fluid into said barrels through said inlet means and to force it out of said barrels through said outlet means, and removable packing means in the adjacent ends of said barrels and about said piston.

8. In a pump, a pair of spaced barrels, inlet and outlet means associated with said barrels, a hollow expansible member in each of said barrels, a piston between said barrels and extending into said members to cause expansion and contraction of said members to draw fluid into said barrels through said inlet means and to force it out of said barrels through said outlet means, a rod connected to said piston, and removable packing means in the adjacent ends of said barrels and about said piston, the connected ends of said piston and rod being movable to a point between said barrels, said piston and rod being then separable to permit the removal and replacement of said packing means.

9. In a pump, a barrel, inlet and outlet means associated with said barrel, said barrel having an opening therein, a hollow, expansible member in said barrel and having an open end adjacent said opening, a piston extending through said opening in said barrel and into said open end of said member to cause expansion and contraction of said member to draw fluid into said barrel through said inlet means and to force it out of said barrel through said outlet means, and removable means to connect and seal said end of said member to said barrel and to pack said piston, said means being accessible from the exterior of said barrel.

10. In a pump, a pair of spaced barrels, inlet and outlet means associated with said barrels, each of said barrels having an opening in its end adjacent the other of said barrels, a hollow, expansible member in each of said barrels and having an open end adjacent the opening in said barrel, a piston between said barrels and extending through said openings in said barrels and into the open ends of said members to cause expansion and contraction of said members to draw fluid into said barrels through said inlet means and to force it out of said barrels through said outlet means, and adjustable and removable means to connect and seal said ends of said members to said barrels and to pack said piston in said openings in said barrels, said means being accessible from the exterior of said barrels.

11. In a pump, a pair of spaced barrels, inlet and outlet means associated with said barrels, a hollow, expansible member in each of said barrels, and a piston between said barrels and extending into said members to expand and contract said members to draw fluid into said barrels through said inlet means and to force it out of said barrels through said outlet means.

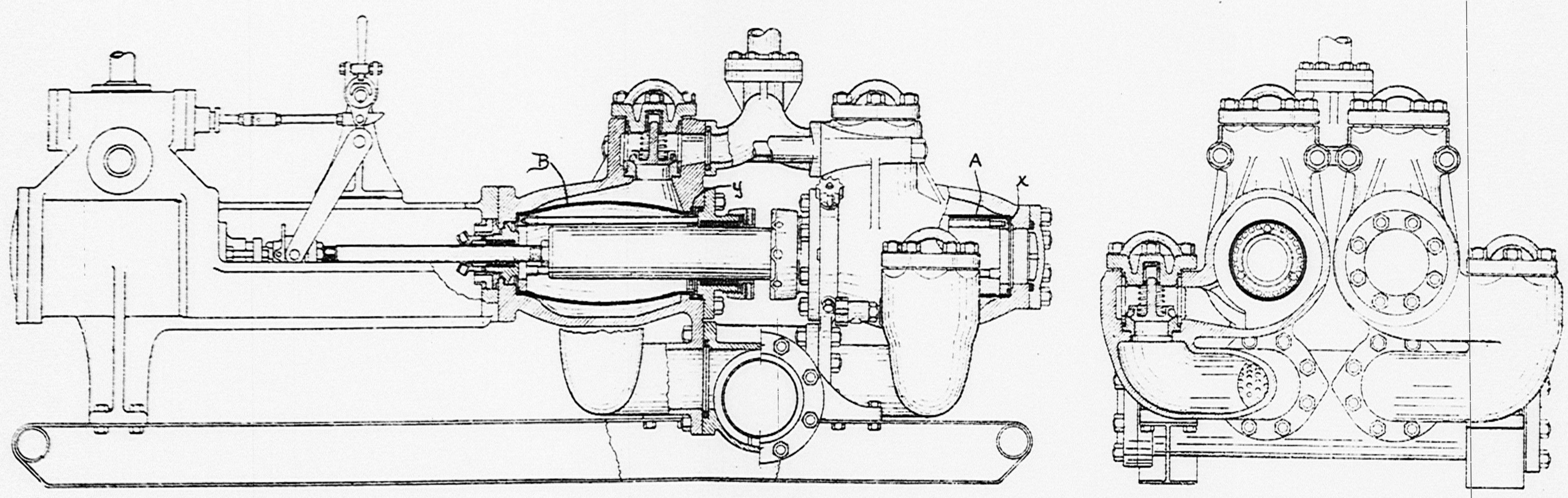
12. In a pump, a pair of spaced barrels, a hollow expansible member in each of said barrels, actuating fluid in said members, a piston between said barrels and reciprocable within both of said members, means intermediate the expansible members and surrounding the piston and adapted to prevent escape of actuating fluid from either of said expansible members, a piston rod connected to one end of the piston and extending through one of said expansible members, and means surrounding said piston rod to which the proximate end of the expansible member is secured for closing said proximate end and preventing escape of actuating fluid from said expansible member around the piston rod.

13. In a pump, the combination of walls forming two opposed chambers open at both ends and arranged in axial alignment, the opposing ends of said chambers being separated to permit access thereto from the exterior, a reciprocating piston extending in the space between and operating within said chambers, a tubular diaphragm in each chamber dividing the chamber into inner and outer compartments and arranged to expand radially with respect to the axis of said reciprocating piston, removable means accessible from said space between said chambers for closing the opposed ends of both compartments, removable means at the outer end of one of said chambers for closing the outer ends of both compartments, and a piston rod extending through said outer removable means and diaphragm end and connected to said piston.

In testimony whereof, I hereunto affix my signature.

CHARLES D. STEPHENS.

Stephens
Exhibit - 5.



FLUID ~~PISTON SLUSH PUMP~~ ABERCROMBIE PUMP CO.

Nov. 15, 1932. J. A. TENNANT 1,888,053

PUMP

Filed May 5, 1932 2 Sheets-Sheet 1

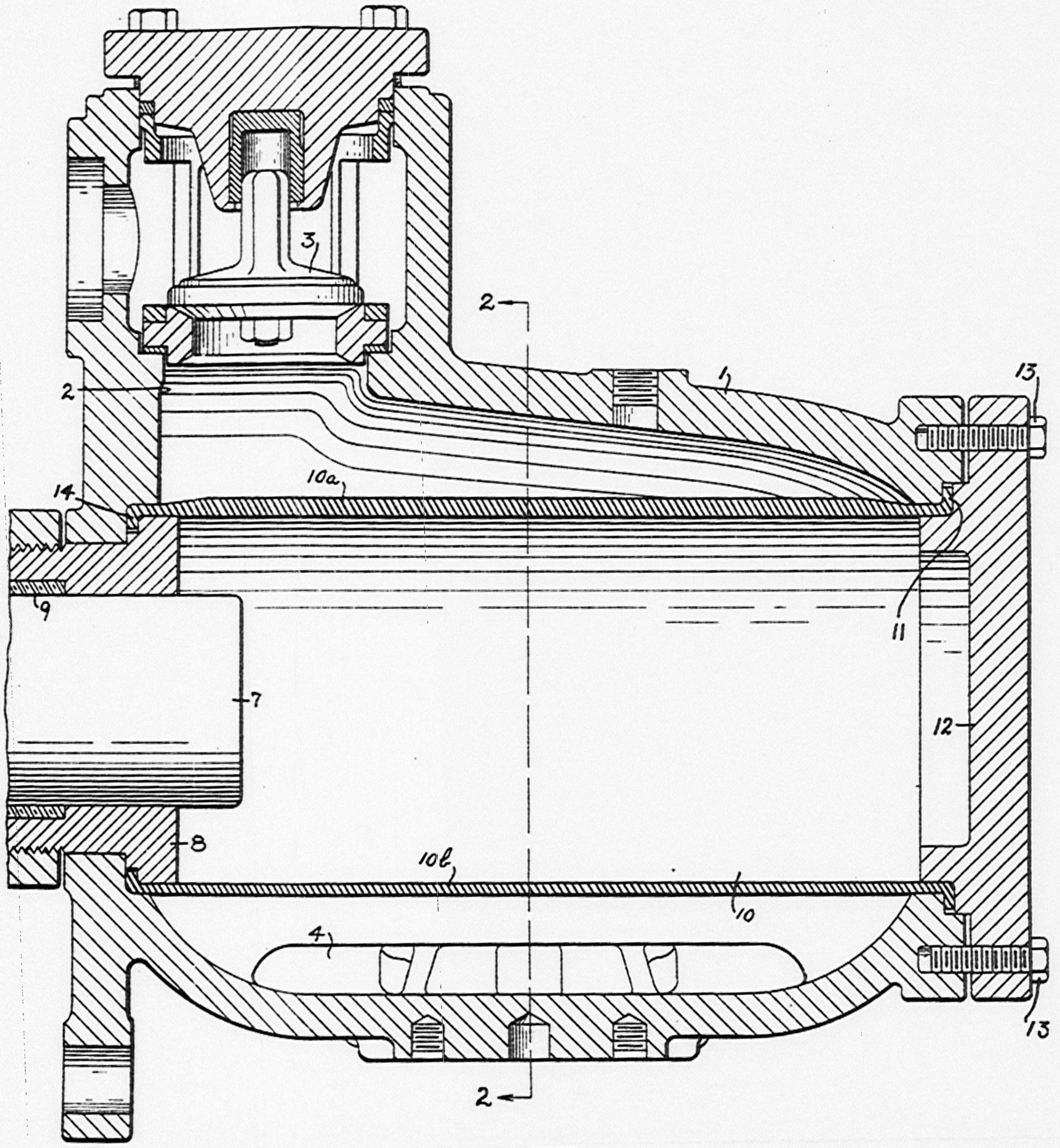


FIG 1.

Joseph A. Tennant
INVENTOR.

BY

J. Vincent Martin
ATTORNEY.

Nov. 15, 1932. J. A. TENNANT **1,888,053**

PUMP

Filed May 5, 1932 2 Sheets-Sheet 2

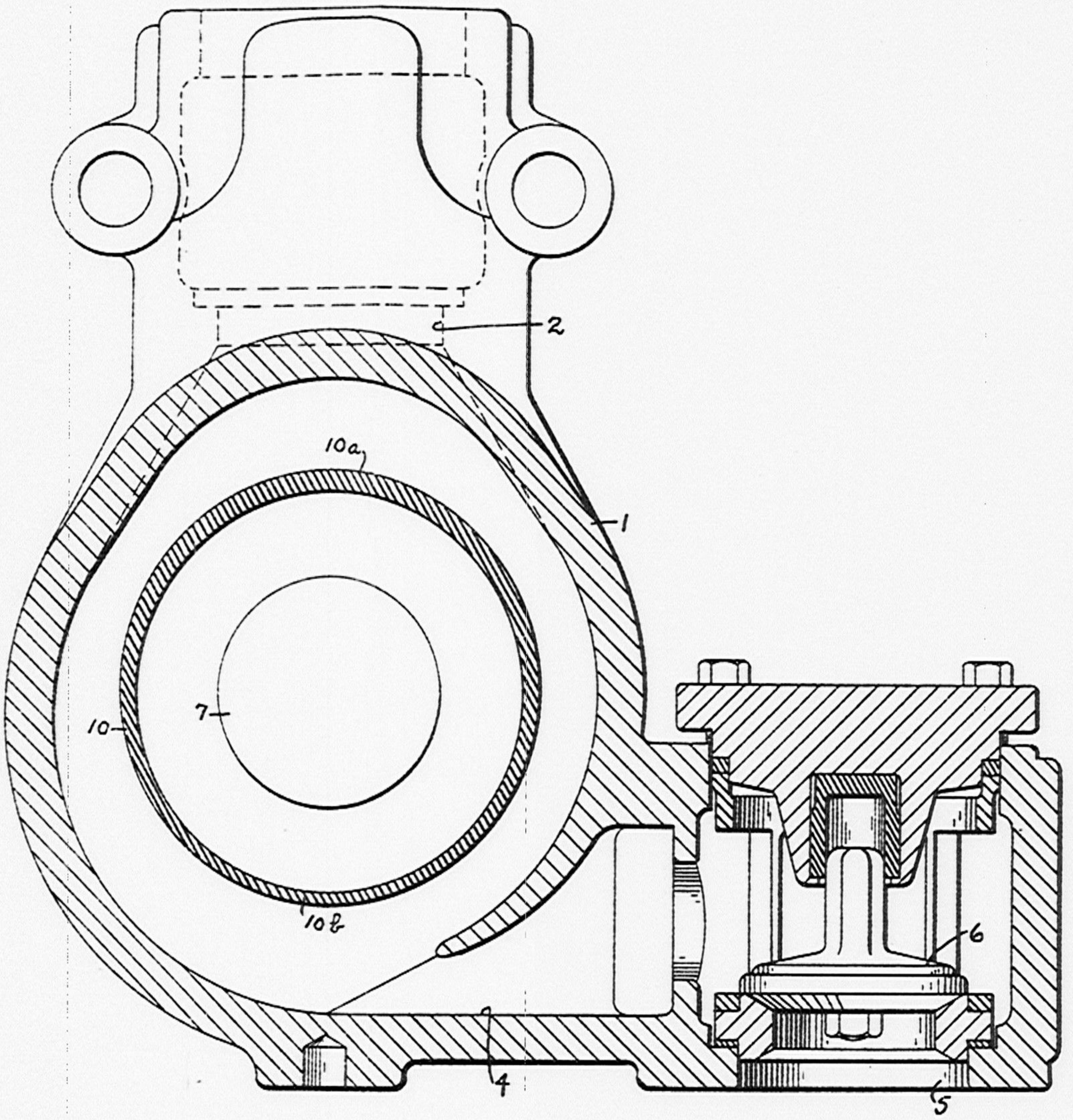


FIG 2.

Joseph A. Tennant
INVENTOR.

BY

J. Vincent Martin
ATTORNEY.

Patented Nov. 15, 1932 **1,888,053**

UNITED STATES PATENT OFFICE

JOSEPH A. TENNANT, OF HOUSTON, TEXAS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STEPHENS PUMP COMPANY, OF ROUND ROCK, TEXAS, A CORPORATION OF DELAWARE

PUMP

Application filed May 5, 1932. Serial No. 609,395.

This invention relates to pumps.

It will be found particularly useful in pumps designed for pumping abrasive and corrosive fluids of the general type disclosed by Letters Patent of the United States to Stephens Number 1,848,441 of March 8, 1932. A conventional pump of this type, adapted for use as a mud or slush pump in deep well drilling, includes a barrel; inlet and outlet valves therefor; a hollow expansible member within the barrel; and a reciprocable piston to actuate fluid confined within the expansible member to cause expansion and contraction thereof, whereby fluid is drawn into and forced out of said barrel. The pumped fluid usually has a specific gravity much higher than that of the actuating fluid within the pumping member. Because of this difference in specific gravity, the pumping member has a tendency to move unwardly. It has also been found that the pumped fluid has a tendency to push the pumping member toward the outlet valve.

To avoid the objectionable results of the foregoing, this invention has for its specific object the provision of a new and improved pumping member constructed to resist expansion in one direction more than in another, so that, when expanded, it will be of the desired shape and in the desired position in the barrel.

However, the invention is not limited to the specific use just referred to. It may be used generally to cause a predetermined expansion of a pumping member into a predetermined shape for various purposes apparent to those skilled in the art.

The preferred embodiment of the pumping member in a pump of the type disclosed by my pending application for Letters Patent of the United States, Serial No. 586,764, filed January 15, 1932, is illustrated by the accompanying drawings of which Fig. 1 is a sectional elevation of the pump; and Fig. 2, a vertical section on the line 2—2 of Fig. 1. In the drawings, the substantially frusto-conical barrel is indicated at 1. It has in its upper portion adjacent its base end an outlet 2 normally closed by an exhaust valve 3. In the lower portion of the barrel is an inlet opening 4 communicating with fluid passageway 5 normally closed by inlet valve 6. A piston 7 extends through the clamp 8 and is packed as indicated at 9.

The new and improved expansible member provided by this invention is indicated at 10. It has on one end an external annular flange 11, compressed by and held between the small end of the barrel 1 and the head 12 which is secured in place by bolts 13; and at the other end an internal annular flange 14 compressed by and held between the base end wall of the barrel 1 and the clamp 8. The ends of the expansible member 10 are thereby connected and sealed to the ends of the barrel 1.

The member 10 is preferably made of rubber and has an upper portion 10*a* which is, from end to end, thicker than the lower portion 10*b* so that the member will resist radial expansion upwardly more than it will resist radial expansion downwardly. As hereinabove stated, the member 10 has a tendency to move upwardly and toward the outlet 2 because of the difference in specific gravity between the pumped fluid and the actuating fluid in the member, and the pushing force of the pumped fluid. The forces tending to move the member 10 toward the outlet 2 are overcome by the resistance offered to such movement by the thicker upper portion 10*a*, so that the member, when expanded, is substantially concentric with the barrel.

The invention is not limited to the preferred embodiment and use herein disclosed.

I claim:

1. A hollow expansible pumping member having one portion of a greater thickness than another portion to resist expansion in one direction more than in another.

2. A substantially cylindrical hollow expansible pumping member having one side of a greater thickness than the opposite side, substantially from end to end, so that said member will resist radial expansion in one direction more than in the opposite direction.

3. A substantially cylindrical hollow rubber pumping member, having one side of a greater thickness than the opposite side, substantially from end to end, so that said

member will resist radial expansion in one direction more than in the opposite direction.

4. A pump having a barrel; inlet and outlet means for said barrel; a hollow expansible pumping member in said barrel; and means to expand and contract said member to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means; that portion of said member adjacent said outlet means being of a greater thickness than that portion of said member remote from said outlet means so that said member will resist expansion toward said outlet means more than it will resist expansion from said outlet means.

5. A pump having a barrel; inlet means in the lower portion of said barrel; outlet means in the upper portion of said barrel; a substantially cylindrical hollow rubber pumping member in said barrel; and means to expand and contract said member to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means; the upper portion of said member being of a greater thickness than the lower portion of said member so that said member will resist expansion toward the upper portion of said barrel more than it will resist expansion toward the lower portion of said barrel.

6. A hollow expansible pumping member having one portion constructed to resist expansion more than another portion so that said member will resist expansion in one direction more than in another.

7. A pump having a barrel; inlet and outlet means for said barrel; a hollow expansible pumping member in said barrel; and means to expand and contract said member to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means; one portion of said member being constructed to resist expansion more than another portion so that said member will resist expansion in one direction more than in another.

8. A pump having a barrel; inlet and outlet means for said barrel; a substantially cylindrical hollow expansible pumping member in said barrel; and means to expand and contract said member to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means; one portion of said member being constructed to resist expansion more than another portion so that said member will resist expansion in one direction more than in another.

9. A pump having a barrel; inlet and outlet means for said barrel; a hollow expansible pumping member in said barrel; and means to expand and contract said member to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means, that portion of said member adjacent said outlet means being so constructed that it resists expansion more than that portion of said member remote from said outlet means so that said member will resist expansion toward said outlet means more than it resists expansion from said inlet means.

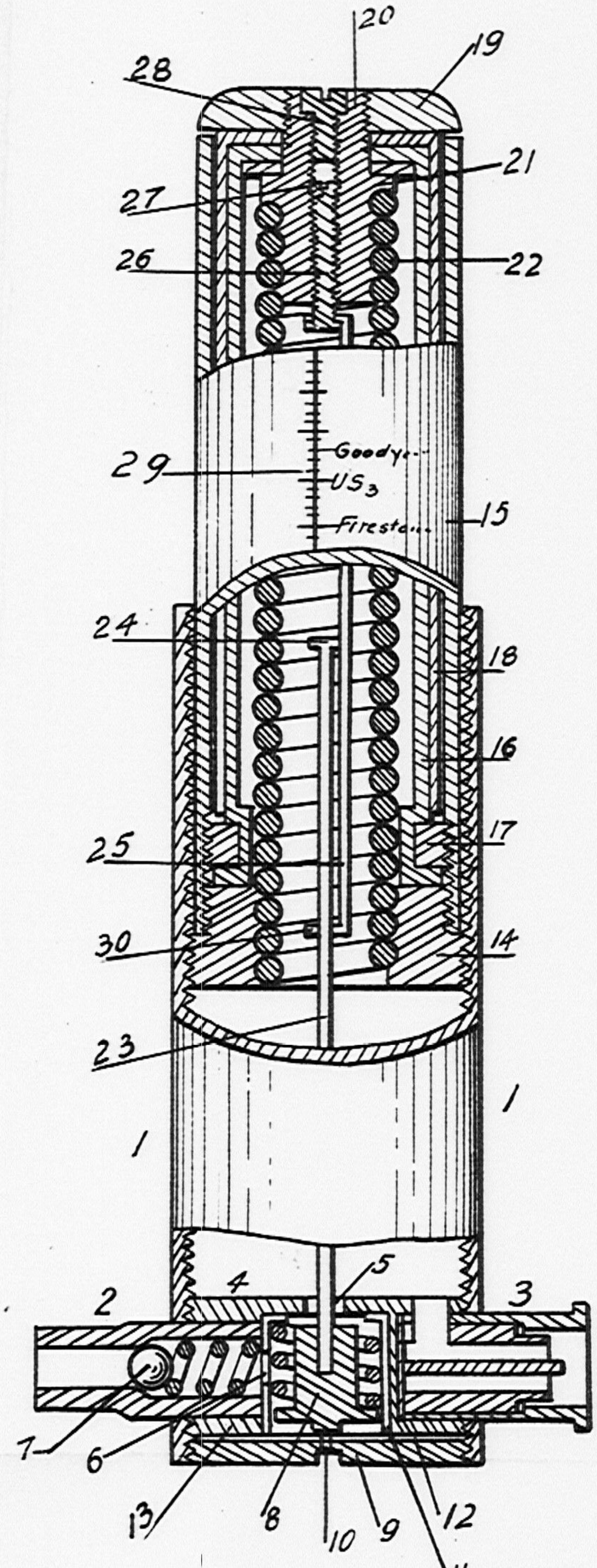
In testimony whereof, I hereunto affix my signature.

JOSEPH A. TENNANT.

Sept. 10, 1929. J. MADARASZ 1,727,474

AUTOMATIC TIRE GAUGE

Filed Dec. 7, 1925



INVENTOR.

Julius Madarasz

BY Clark C Wood

ATTORNEY.

Patented Sept. 10, 1929. **1,727,474**

UNITED STATES PATENT OFFICE.

JULIUS MADARASZ, OF EAST LANSING, MICHIGAN.

AUTOMATIC TIRE GAUGE.

Application filed December 7, 1925. Serial No. 73,918.

My invention relates to an improved pressure gauge for automobile tires, with improved automatic shut off for the air when the desired pressure is reached.

I attain these purposes by the means shown in the accompanying drawing in which the figure is an elevation of one modification of my device, a part of the exterior walls being broken away to show the interior construction.

In the drawing, 1 is a metallic tube forming the main body of my device. It is provided at its lower end with a valved tube 2 of any suitable type adapted to connect with a source of compressed air supply. A second tube 3 is adapted to connect with the ordinary tire tube and may also be of any desired construction. The construction shown in the drawing is of a usual type customarily employed in tire gauges and does not seem to require further explanation. A partition 4 is inserted in the tube 1 above the body 1 which is preferably threaded on the inside and this partition screwed in to keep it in position but any other method of fastening it in position may be employed without departing from my invention. Openings 5 and 6 connect the interior of the tubes with the interior of the tube 2. A valve 7 normally keeps the tube 2 closed until opened by the pressure of the incoming air. A second valve 8 is inserted in the partition 4 and a second partition 9, closes the end of the tube 1. A small opening 10 is formed through the partition 9, having a purpose that will be explained in connection with the operation of the device. The valve 8 is normally kept in the position shown in the drawing by a spring 11. A packing 12 is introduced between the partitions 4 and 9 to prevent the escape of air. A ring 14 is screwed into the tube 1 which is threaded on its interior surface to receive it. The upper part of the ring 14 is made smaller and is threaded on its outer surface to engage with inner threads on an inner tube 15 and thus hold the two firmly together. In the form shown in Fig. 1, a third tube 16 formed of elastic rubber or some other readily extensible material is firmly attached to the ring 14 by a ring 17. Another metallic tube 18 is inserted within the tube 15. A cap 19 is mounted on the upper end of the tube 18 and is provided at its center with a threaded plug 20 which is flanged inside as shown at 21 so that when the cap 19 is screwed down it will firmly compress and hold in position the tubes 16 and 18. A spring 22 is attached at one end to the plug 20 and at the other end to the ring 14. A rod 23 is attached at one end to the valve 8 and is provided with a head 24 at the other. A second rod 25 is attached at the upper end to the screw 26 which is threaded into the plug 20 and is provided at its upper end with a slot 27 for purposes of adjusting the graduations to each other, as will be more fully explained hereafter. A screw 28 is inserted in the upper end of the threaded passage of the tube 20 for the purpose of closing this passage and may be removed to adjust the screw 26.

Graduations 29 are formed on the outside of the tube 15 for the purpose of adjustment as will be more fully explained in connection with the operation. If desired, the tube 18 may also be graduated on the outside for the purpose of reading the pressure within the tire.

The operation of my device is as follows:

When the tube 2 is connected to any source of compressed air the air rushes in forcing open the valve 7 and passing through the openings 6 and 5 into the interior of the tubes, but is prevented from escaping by the tube 16, and forces outward the tube 18 against the tension of the spring 22 and the elastic tube 16, until the flange 30 on the rod 25 engages with the head 24 on the rod 23. When this occurs the rod 23 rises, carrying with it the valve 8 and the passage 5 is closed so that no more air is admitted. At the same time this opens the passage 10 and permits a small portion of air to escape with a whistling sound notifying the operator that the required pressure is reached. Adjustment is made for the desired pressure by turning the tube 15 carrying with it the ring 14. When this tube 15 is turned inward it carries with it all the parts within it including the rod 25, and thus increases the travel of the tube 18 that will be necessary before

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the foot 30 of the rod 23, and thus close the valve 8, thus requiring a greater amount of pressure to close the valve. Conversely, by screwing the tube out, the required travel is less and the tension and pressure consequently also less. As already stated, the tube 15 is graduated on its outer surface to show the point to which it must be screwed in to show any desired pressure for the closing of the valve. If graduations are used on the tube 18, they should read the same as those on the tube 15 when the valve 5 closes. If they do not do so, the plug 28 may be removed and the position of the rod 25 adjusted by means of the screw 26.

While I have described the construction in the forms which I believe to be preferable, it is evident that the details of construction might be modified in many ways without departing from my invention. For example, the screw 26 and the rod 25 might be formed of one piece of metal or the tube 15 may be outside the body 1, and the tube 18 outside that, without departing from my invention.

I claim as my invention and desire to secure by Letters Patent:

In an automatic tire gauge, the combination of telescoped tubes with adjustable spring connections for indicating the pressure, one of said tubes being elastic, a valve connection admitting air to said gauge, means for relatively adjusting said tubes disposed at the end of said gauge, a shut-off valve for the said connection, a connecting rod from said shut-off valve axially disposed in said gauge tubes with a suitable stop head thereon, and a sliding connection in the telescoping part of said gauge for actuating the said connecting rod to shut off the valve when predetermined pressure is reached, and an alarm with valve connected to be opened when the cut-off is closed.

JULIUS MADARASZ.

FIG.1

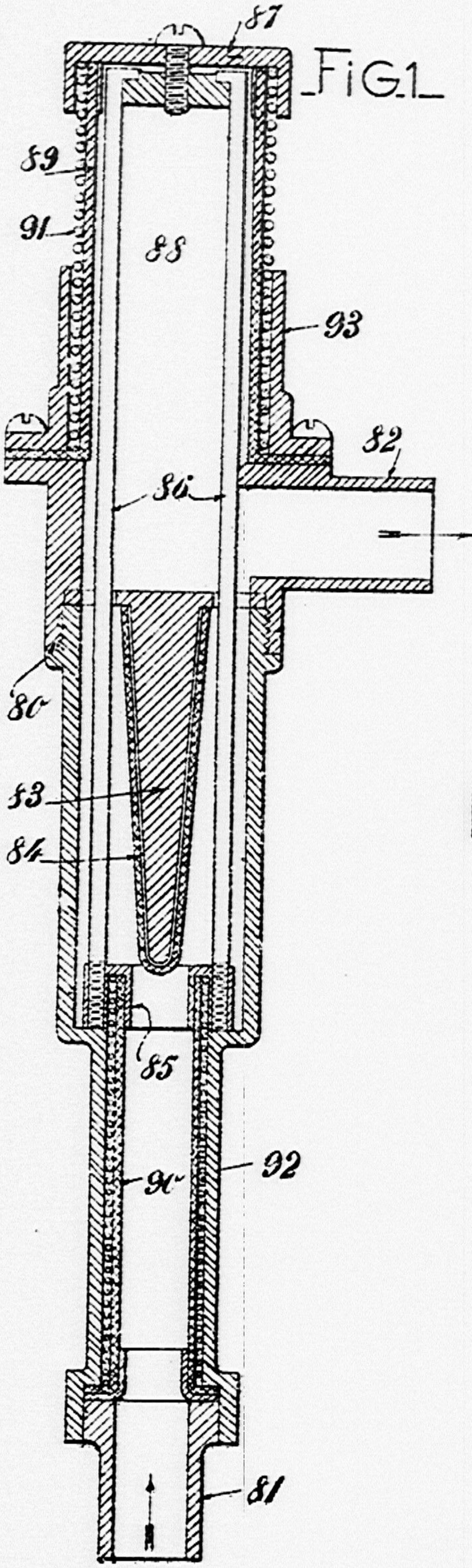
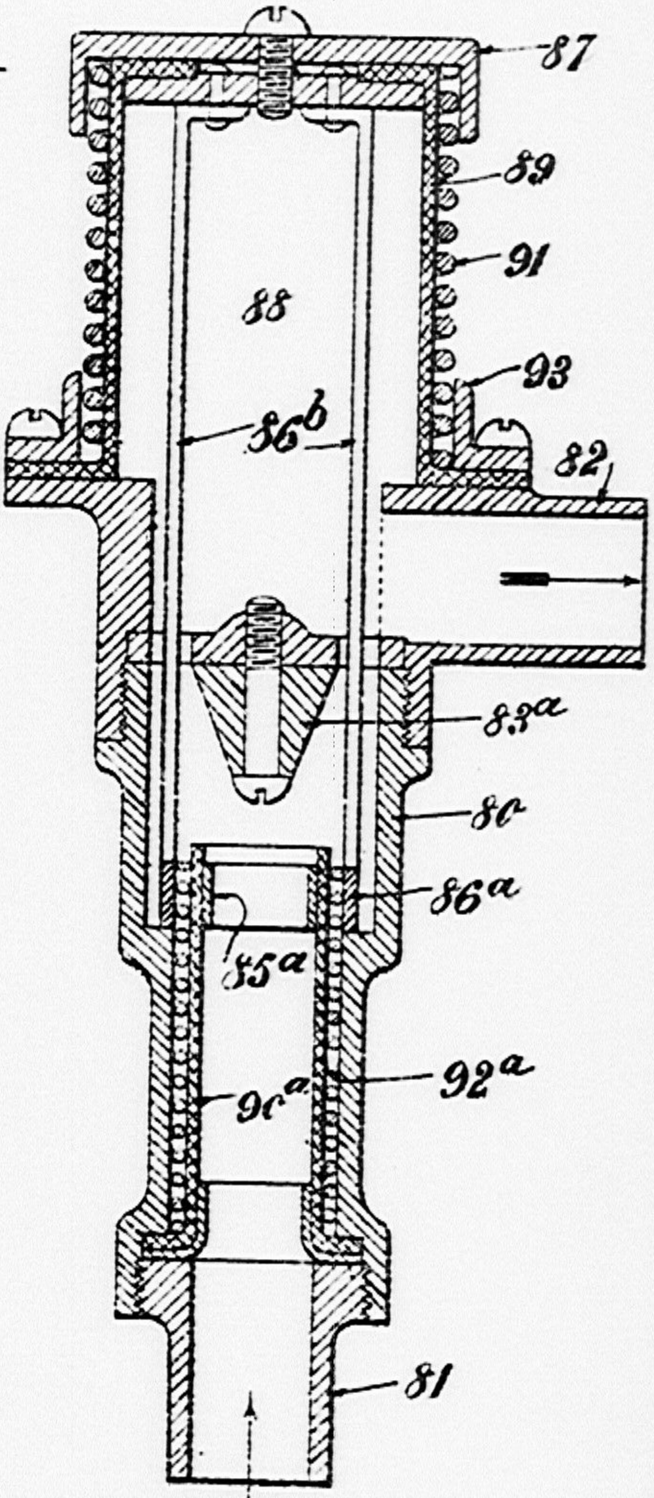


FIG.2



It is our opinion that those in the pump art should be thus entitled to utilize the showing of Samain et al. or Madarasz to supplement Dunkle to this extent and we accordingly hold that invention is not involved in the pump art in merely utilizing tubular members with internal and external flanges such as shown by these patents.

Claims 4 and 5 set forth some elements not directly anticipated in this relation, namely, the stiffening and strengthening of the ends of the plain cylindrical expansible member in claim 4, and the ends having flanges so strengthened and reinforced in claim 5. The Examiner relies upon Farmer to show this feature.

Farmer illustrates an annular disk-like diaphragm which has a U-shaped fold in the annular body of the disk with a peripheral and an internal flange both reinforced. The relation of reinforcing fabric in Farmer's diaphragm is in the identical relation to the flange and cylindrical wall that it is in applicant's diaphragm and is for the same purpose. No new or unobvious result is apparently produced by broadly reinforcing the tube of Madarasz or Samain et al. by Farmer's fabric means. Such broad association fully anticipates the terms of claims 4 and 5. In such circumstances we consider that patentable merits is not
59 presented by these claims.

The decision of the Examiner is affirmed.

554740

W. E. RUCKMAN,
Examiner-in-Chief
W. L. REDROW,
Examiner-in-Chief
E. T. MORGAN,
Examiner-in-Chief
Board of Appeals

March 3, 1934.

60 Assembled by M. H. Revised by .... Letter No. 136,623. Date 10/29/35.

(Here follows diagram marked page 61 and pages marked 62 to 76)

77 Translation of French patent no. 19483, 2nd. addition to patent no. 462,469, class V-3, to Messrs. Pierre Samain and Joseph- Marie Morand residing in France

(Haute-Savoie) applied for Oct. 30, 1913, granted November 10, 1914, published Feb. 11, 1915. (main patent taken out Nov. 23, 1912, first patent of addition no. 18,793).

Apparatus for reducing and regulating pressure for liquids and gases.

This addition relates to various constructive modifications made in the apparatus described in the main patent and in the first patent of addition. The new arrangements have a great similarity to that shown in fig. 1 of the first patent of addition, the chief difference being that the conical portion forming the flap valve is fixed and cooperates with a mobile tubular obturator. Furthermore the elastic suspension counterweight is omitted and replaced by a counterweight placed in the upper part of the apparatus and connected to the mobile obturator by rods.

78 In the drawing attached hereto figs. 1 and 2 are longitudinal sections of two new arrangements.

The dome or housing 80 of the apparatus comprises at the bottom the water intake pipe 81 and at the top the lateral outlet pipe 82. In this housing is disposed a fixed cone 83, much elongated, covered with a rubber jacket 84 or one of any other material permitting the insuring of a better joint. A tubular obturator 85 can move in the said housing and can cap the cone 83 so as to interrupt the passage of the liquid. This obturator carries by the intermediary of two rods 86 a cap 87 which we can weight in any manner so that the obturator will rise only when the downward pressure which is felt at 88 under the cap attains a definite value determined in advance. The joints are protected without any stuffing-box by extensible sleeves or coverings of rubber 89, 90 which are suitably supported by a framework formed by a wire wound in a spiral, as shown at 91 and 92, this framework permitting them to resist the pressure of the fluid, 93 designates a sleeve guiding the lower end of the wire 91. The cone 83 being very much elongated the closing will be effected slowly which makes this arrangement advantageous when water-hammering is feared.

79 The arrangement shown in fig. 2 differs from the preceding only in construction details which we see clearly in the drawing. In particular the cone 83 is less elongated which results in a rapid closing. The tubular obturator is here formed by a simple ring 85a which is en-

gaged on the inside of the rubber sleeve 90a which as well as the wire framework 92a is engaged in an annular head 86b connecting the lower ends of the two rods 86a.

The apparatus, under any of its forms, may also be used as relief valve for any gas or vapor: steam, compressed air, acetylene, carbonic acid, etc.

Resumé

The patent of addition consists chiefly in connecting the obturator, which is tubular, by means of rods to a cap situated above and to which we give any suitable weight depending on the reduced pressure desired, the joints being insured by extensible sleeves and in particular by rubber tubes with metal framework.

Tr/CP.
10/25/35.

Endorsed on cover: District of Columbia Supreme Court. No. 6681. Stephens Pump Company et al., Appellants, vs. Conway P. Coe, Commissioner of Patents. United States Court of Appeals for the District of Columbia. Filed April 6, 1936. Moncure Burke, Clerk.

(Here follows pages marked 80 to 85)

68

W. E. DUNKLE.
DIAPHRAGM PUMP.
APPLICATION FILED DEC. 23, 1919.

1,389,635. **Patented Sept. 6, 1921.**

FIG. 1

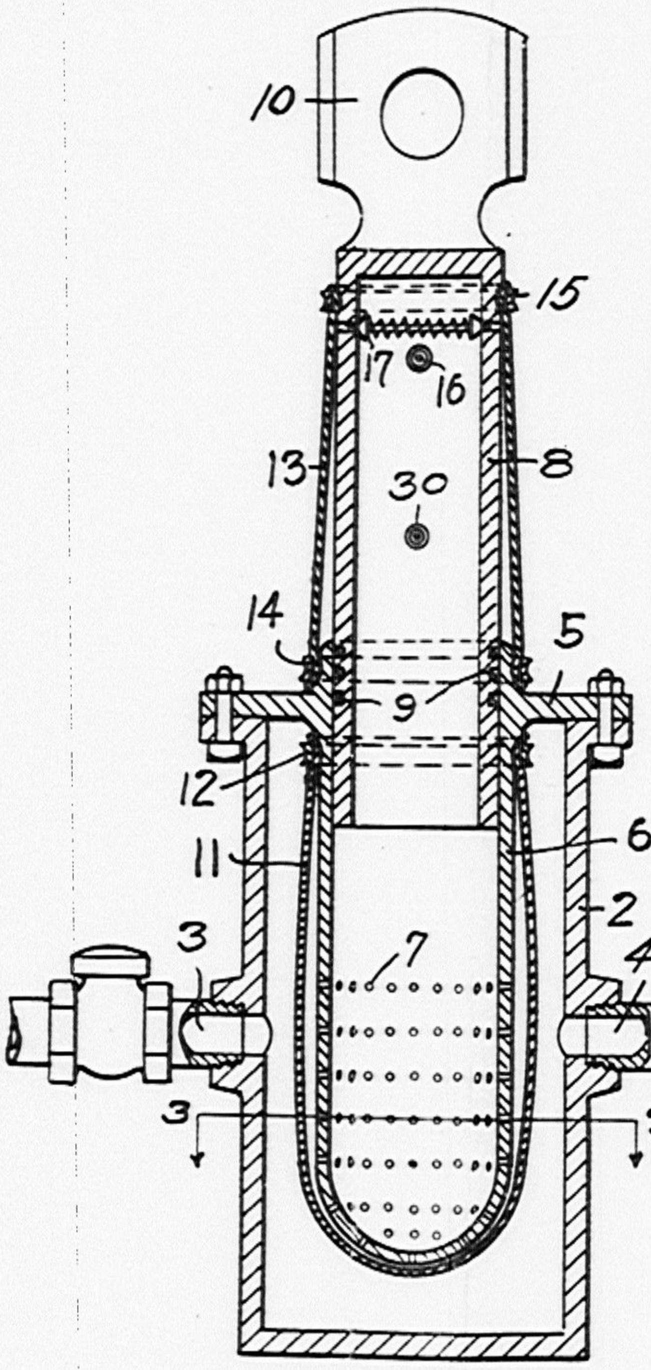


FIG. 3

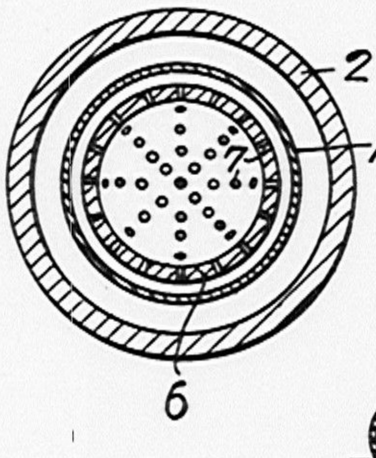


FIG. 2

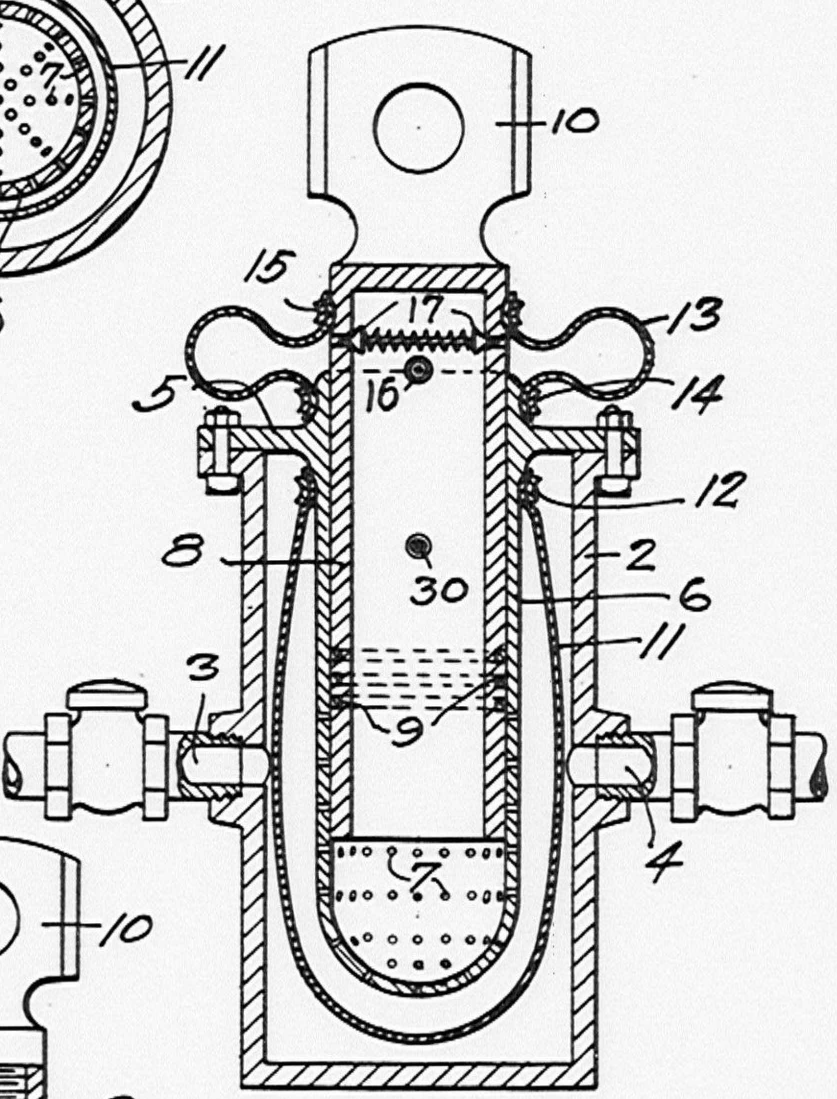
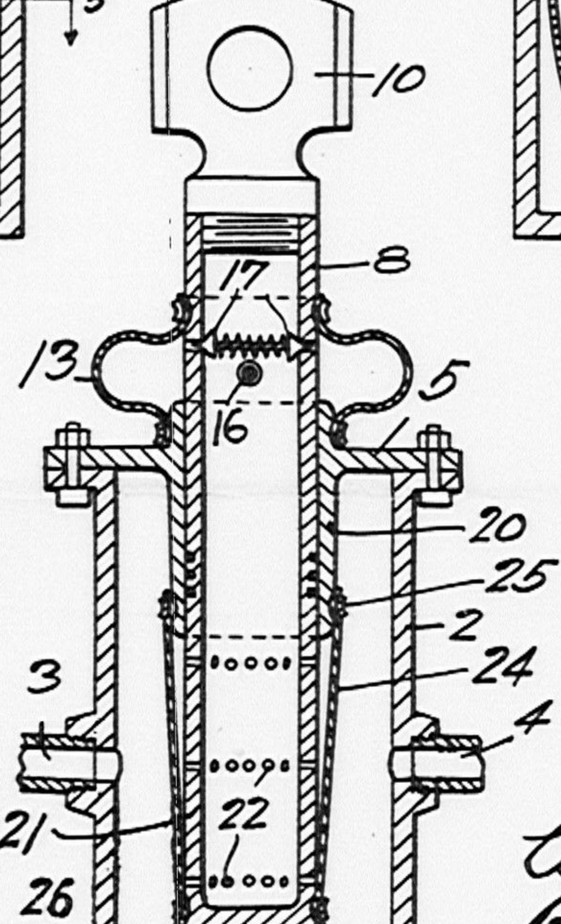


FIG. 4



INVENTOR
Wesley E. Dunkle
By Kay & Totten
Attorneys

UNITED STATES PATENT OFFICE.

WESLEY E. DUNKLE, OF CONTACT, NEVADA.

DIAPHRAGM-PUMP.

1,389,635. Specification of Letters Patent. **Patented Sept. 6, 1921.**

Application filed December 23, 1919. Serial No. 346,862.

To all whom it may concern:

Be it known that I, Wesley E. Dunkle, a citizen of the United States, and resident of Contact, in the county of Elko and State of Nevada, have invented a new and useful Improvement in Diaphragm-Pumps; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to diaphragm pumps, and it has for its object to provide a pump of the character indicated in which communication between the interior of the pump and the outer air is effectively provided, in which an annular diaphragm is alternately distended and collapsed by forcing fluid into and out of the diaphragm and in which these results are produced by a simple and effective arrangement of parts.

In the accompanying drawing, Figure 1 is a vertical sectional view showing a pump constructed in accordance with my invention with the piston at the limit of its outward movement; Fig. 2 is a vertical sectional view similar to Fig. 1 showing the piston at the limit of its inward movement; Fig. 3 is a transverse sectional view of the same structure, the section being taken substantially along the line 3—3, Fig. 1; and Fig. 4 is a vertical sectional view showing a modified form of plunger and diaphragm construction.

Referring first to Figs. 1 and 2 of the drawing, the pump therein shown comprises a cylinder or casing 2 provided with suitable valved inlet and outlet connections 3 and 4. The cover 5 of the cylinder 2 is provided with a central circular opening around which is disposed a tubular member 6 that extends into the casing and is provided with small perforations 7 upon its side walls and upon its closed inner end. A hollow plunger 8 provided with the usual expansive piston rings 9, is adapted to reciprocate within the tubular member 6 and is attached at its outer end to a cross-head 10.

Surrounding the tubular member 6 is an annular diaphragm 11 of rubber or other flexible sheet material, the open end of which is securely attached by means of a band 12 or otherwise to the tubular member 6 near the cover 5. A second annular diaphragm 13 surrounds the plunger 8 outside of the casing 12, and has its ends attached, respectively, to the casing and to the plunger by means of bands 14 and 15.

The plunger 8 and the perforated tubular member 6 are filled with a liquid preferably an oil which is not injurious to the rubber or other material of which the diaphragms 11 and 13 are composed. The amount of liquid is preferably such that when the plunger is withdrawn to the limit of its outward movement, as shown in Fig. 1, the diaphragm 11 will not quite touch the tubular member 6. The reciprocation of the plunger 8 causes a small amount of oil to work up outside of the plunger and enter the space between the plunger and the outside diaphragm 13, and in order to permit such oil to reënter the plunger on the suction stroke of the pump, I provide suitable check valves 16 and 17 in the plunger. The holes leading to these check valves are so small that the rubber diaphragm 13 will not be drawn into them. The diaphragm may, if desired, be made with an insertion of cloth or other non-elastic sheet material opposite the valve ports, in order to prevent stretching and rubbing of the diaphragm at this point.

The modified device shown in Fig. 4 is similar in its general construction to the pump shown in Figs. 1, 2 and 3 and the corresponding parts are correspondingly numbered. In the device of Fig. 4, however, the tubular member 6 is omitted and the plunger 8 reciprocates within an annular bearing 20 formed on or attached to the cover 5 of the casing 2, and extending either into the casing or above it, as desired. The plunger is provided with an inwardly extending portion 21 having lateral perforations 22 and having its inner end closed, as shown at 23. An annular diaphragm 24 surrounds the inner portion 21 of the plunger and has its ends attached respectively to the bearing 20 and to the inner end of the plunger by means of bands 25 and 26.

The operation of my diaphragm pump will be evident from an inspection of Figs. 1 and 2. When the plunger is moved into the cylinder, as shown in Fig. 2, oil is forced through the perforations 7 and distends the diaphragm 11, thereby forcing the liquid that is being pumped through the outlet connection 4. When the plunger is withdrawn as shown in Fig. 1, the diaphragm 11 is collapsed and liquid is thereby drawn into the cylinder through the inlet connection 3. The pump of Fig. 4 operated similarly, except that the displacement of liquid within the casing is effected by the plunger itself, and not by the simple distention of the inner diaphragm.

If it should happen that pumping conditions are such as to produce a greater pressure on the upper diaphragm than on the lower diaphragm, the oil in the upper space may eventually be forced past the plunger into the lower space, which would leave the upper part of the plunger without lubrication. It may therefore be desirable to provide another check-valve 30 below the valves 16—17 at a point that will come above the upper edge of the casing at an intermediate point in the stroke, and to set this lower check valve to open on the pulsion stroke, so as to insure a circulation of oil. The port to this valve should be of less capacity than the ports draining the upper space through the valves 16—17.

My diaphragm pump is of special advantage in pumping liquids which are corrosive or gritty and which give off poisonous or otherwise injurious fumes which might leak through ordinary pump packing. Packing friction and air leakage at the gland is entirely eliminated in my device and the efficiency of the pump is thereby increased.

While I have herein shown certain preferred embodiments of my invention, it is obvious that numerous changes in the construction and arrangement of parts may be made without departing from the principles of my invention. I, therefore, desire that no limitations be imposed on my invention except such as are indicated in the appended claims.

What I claim is:

1. A pump comprising a reciprocable plunger and a tubular, radially distensible working diaphragm surrounding the said plunger.

2. A pump comprising a reciprocable plunger, a bearing therefor, and a tubular, radially distensible working diaphragm surrounding the said plunger.

3. A pump comprising a casing, a tubular diaphragm disposed therein, and means for intermittently and radially distending the said diaphragm by forcing fluid thereinto.

4. A pump comprising a casing, a plunger adapted to enter the said casing, and a flexible radially distensible working diaphragm surrounding the said plunger within the said casing.

5. A pump comprising a casing, a hollow fluid-filled plunger adapted to enter the said casing, and a flexible working diaphragm surrounding the said plunger within the said casing and adapted to be distended when the said plunger moves into the said casing.

6. A pump comprising a casing, a plunger adapted to enter the said casing, and a flexible radially distensible diaphragm surrounding the said plunger within the said casing, the said diaphragm having one of its ends attached to the said casing.

7. A pump comprising a casing, a plunger adapted to enter the said casing, a flexible diaphragm disposed within the said casing and surrounding the said plunger, and a second flexible diaphragm surrounding the said plunger outside of the said casing.

8. A pump comprising a casing, a hollow, liquid-filled plunger adapted to enter the said casing, a flexible diaphragm disposed within the said casing and surrounding the said plunger, a second flexible diaphragm surrounding the said plunger outside of the said casing and a check-valve in the said plunger permitting the entrance of liquid into the said plunger from the space inclosed by the said outside diaphragm.

9. A pump comprising a casing, a plunger adapted to enter the said casing, and a tubular flexible diaphragm surrounding the said plunger within the said casing, the said diaphragm having one of its ends attached to the said casing and having its other end closed.

10. A pump comprising a casing, a perforated tubular member disposed therein, a plunger adapted to enter the said tubular member, and a flexible diaphragm surrounding the said tubular member.

11. A pump comprising a casing, a perforated tubular member disposed therein, a liquid-filled plunger adapted to enter the said tubular member, and a flexible diaphragm surrounding the said tubular member and adapted to be distended by liquid forced by the said plunger through the perforations of the said tubular member.

12. A pump comprising a casing, a tubular member extending into the said casing and provided with a closed inner end and with perforations formed in its side and end walls, a plunger adapted to enter the said tubular member and a flexible diaphragm surrounding the said tubular member, the said diaphragm having one of its ends attached to the said tubular member and having its other end closed to surround the closed end of the said tubular member.

13. A pump comprising a casing, a tubular member extending into the said casing and provided with a closed inner end and with perforations formed in its side and end walls, a hollow liquid-filled plunger adapted to reciprocate within the said tubular member, a flexible diaphragm surrounding the said tubular member, the said diaphragm having one of its ends attached to the said

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tubular member and having its other end closed to surround the closed end of the said tubular member, a second flexible diaphragm surrounding the said plunger outside of the said casing, and having its ends secured respectively, to the said casing and to the said plunger and a check-valve in the said plunger permitting the entrance of liquid into the said plunger from the space inclosed by the said outside diaphragm.

In testimony whereof, I, the said WESLEY E. DUNKLE, have hereunto set my hand.

WESLEY E. DUNKLE.

Witnesses:
FLORENCE H. DUNKLE,
W. A. KENT.

72

Jan. 27, 1931. C. C. FARMER **1,790,206**

FLEXIBLE DIAPHRAGM

Filed June 2, 1927

Fig.2.

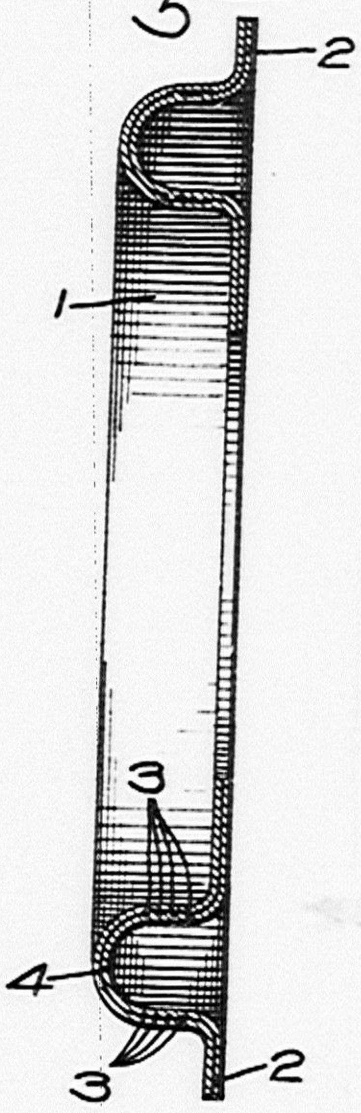


Fig.1.

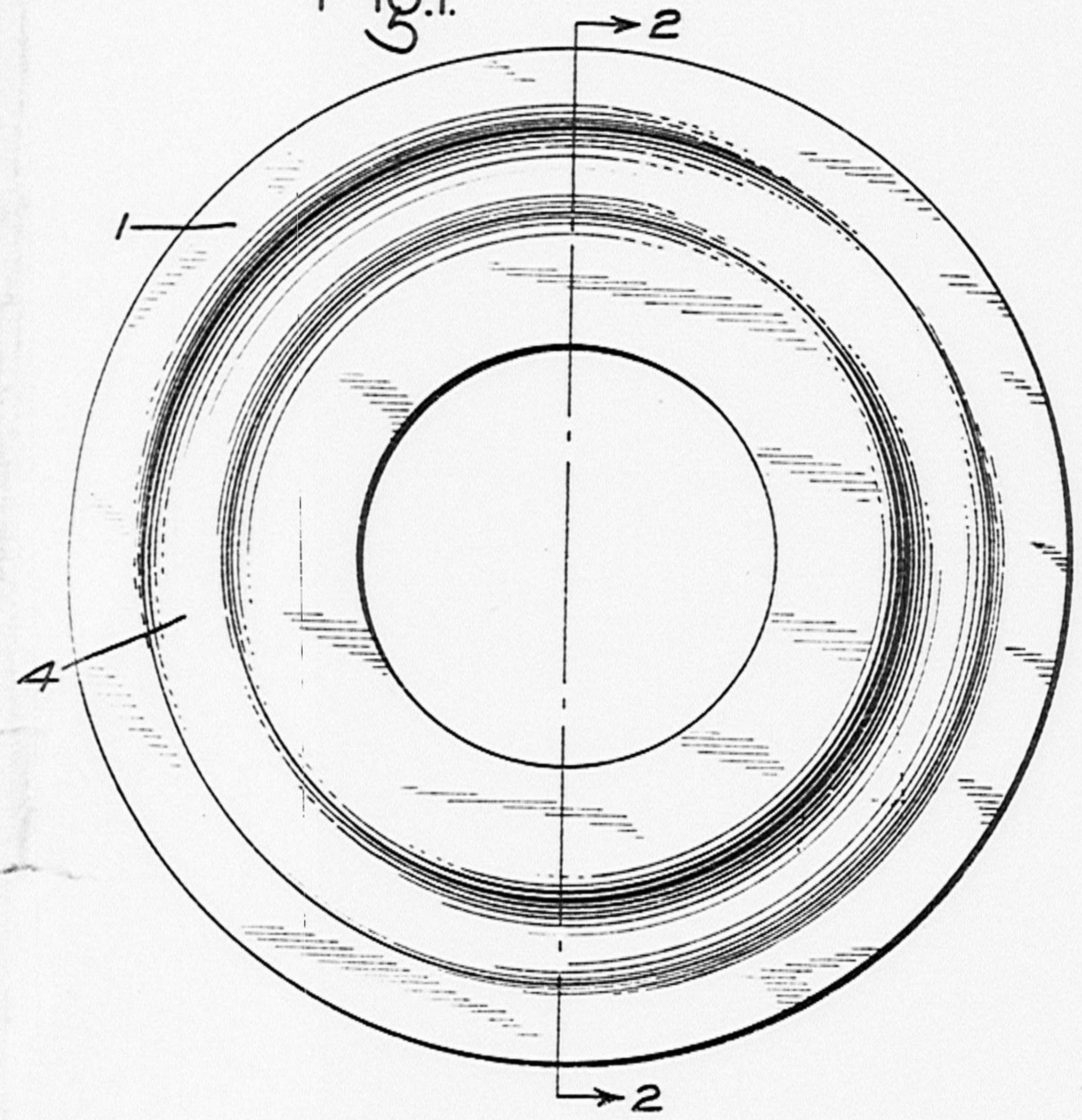


Fig.4.

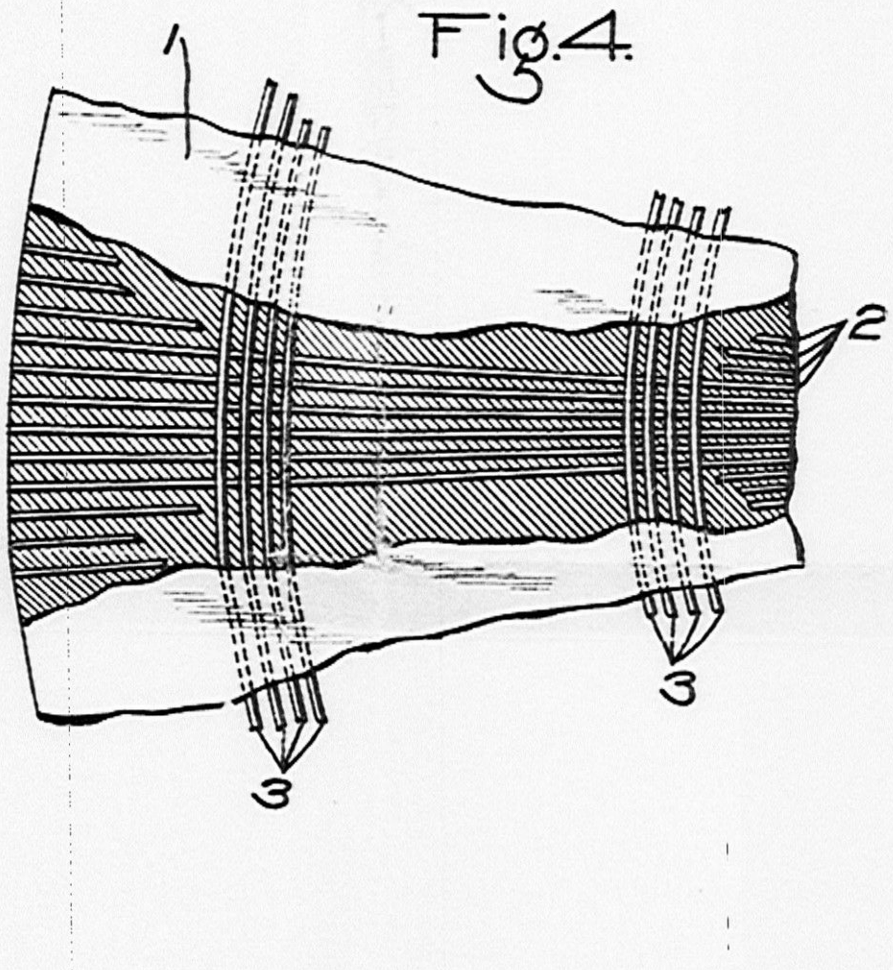
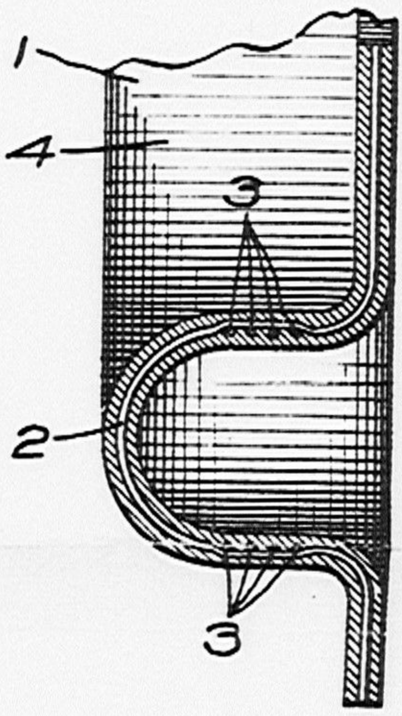


Fig.3.



INVENTOR
CLYDE C. FARMER
BY Wm. M. Cady
ATTORNEY

73

Patented Jan. 27, 1931 **1,790,206**

UNITED STATES PATENT OFFICE

CLYDE C. FARMER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

FLEXIBLE DIAPHRAGM

Application filed June 2, 1927. Serial No. 196,077.

This invention relates to flexible diaphragms of the type adapted to be clamped at the outer edge and which is flexed in service to accomplish various purposes.

The principal object of the invention is to provide an improved flexible diaphragm having a **U**-shaped annular fold adjacent its periphery, the sides of which fold are so reinforced as to resist the tendency of circumferential tension on the diaphragm which might be produced by the pressure acting upon the diaphragm, especially when the **U**-shaped fold is of such a depth as to provide for considerable follower travel.

In the accompanying drawing, Fig. 1 is a plan view of a flexible diaphragm constructed in accordance with my invention; Fig. 2 is a sectional view of the same taken on the line 2—2 of Fig. 1; Fig. 3 is an enlarged sectional view of a portion of the flexible diaphragm taken on the line 3—3 of Fig. 1; and Fig. 4 is an enlarged diagrammatic plan view of a portion of the flexible diaphragm before the **U**-shaped fold is formed therein, part of the view being in section to more clearly illustrate the invention.

According to my invention, the diaphragm 1, as shown in the drawing, comprises a disk of rubber composition, having radially disposed cords 2 and cords 3 concentric with the periphery of the diaphragm and all of such cords are embedded in the rubber composition.

Adjacent its periphery, this diaphragm is provided with an annular **U**-shaped corrugation or fold 4, at which fold the flexing of the diaphragm takes place. The cords 3 cross the cords 2 and when the fold 4 is formed these cords 3 will be disposed one above the other and will form a part of the side walls of the fold.

The provision of the **U**-shaped fold in the diaphragm makes the diaphragm very sensitive or responsive to changes in pressure on the diaphragm and the radial cord reinforcement strengthens the diaphragm so as to withstand continual flexing for a long time without rupture or breaking, while the cords 3 strengthen the walls of the fold 4 so that they will resist the tendency of circumferential tension on the diaphragm which might be caused by the pressure of the fluid acting upon the diaphragm, thus preventing any stretching of the diaphragm and consequent weakening of the same.

In the drawing, each of the side walls of the fold 4 have been illustrated as embodying four reinforcing cords 3, but it will be understood that this number may be increased or decreased, depending upon the depth of the fold. In some instances the reinforcing cords 3 may be embodied in only one of the side walls.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A flexible diaphragm comprising a disk of rubber composition having a substantially **U**-shaped annular fold adjacent its periphery, and a plurality of cords arranged one above the other and each in the form of an annulus and embedded in each of the side walls of said fold.

2. A flexible diaphragm comprising a disk of rubber composition having a substantially **U**-shaped annular fold adjacent its periphery, radially disposed cords embedded therein, and a cord in the form of an annulus crossing said radially disposed cords in one of the side walls of said fold.

3. A flexible diaphragm comprising a disk of rubber composition having a substantially **U**-shaped annular fold adjacent its periphery, radially disposed cords embedded therein, and a plurality of cords in the side walls of said fold and crossing said radially disposed cords.

4. A flexible diaphragm comprising a disk of rubber composition having a substantially **U**-shaped annular fold adjacent its periphery, radially disposed cords embedded therein, and a plurality of cords in the side walls of said fold, arranged one above the other and crossing said radially disposed cords.

In testimony whereof I have hereunto set my hand.

CLYDE C. FARMER.

UNITED STATES
COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA
FILED SEP 15 1936
CLERK

No. 6681

In the United States Court of Appeals for the District of Columbia

OCTOBER TERM, 1936

STEPHENS PUMP COMPANY AND CHARLES D. STEPHENS, APPELLANTS

vs.

CONWAY P. COE, COMMISSIONER OF PATENTS, APPELLEE

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA (NOW THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA)

BRIEF FOR THE COMMISSIONER OF PATENTS

R. F. WHITEHEAD,
Solicitor, United States Patent Office.

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In the United States Court of Appeals for the District of Columbia

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APPELLEE

APPEAL FROM THE SUPREME COURT OF THE DISTRICT OF COLUMBIA (NOW THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF COLUMBIA)

BRIEF FOR THE COMMISSIONER OF PATENTS

This is an appeal from the decree of the Supreme Court of the District of Columbia [now the District Court of the United States for the District of Columbia] (R., p. 10) dismissing plaintiffs' bill of complaint filed under the provisions of Section 4915 R. S. (35 U. S. C. 63).

By that proceeding appellants sought to have the Commissioner of Patents authorized to issue a patent on the application of Charles D. Stephens, for a pumping element, containing claims 1 to 5, inclusive, as set out in paragraph 6 of the bill (R., p. 5).

The Stephens application discloses a pump having associated with the piston thereof two flexible, tubular members. One end of each member is connected to the wall of the pump and the other to the center of the cylinder in which the piston moves. Oil is placed in each of the members and upon reciprocation of the piston the walls of the members are alternately contracted and extended, causing liquid to be drawn into and forced from the chambers surrounding the ends of the cylinder. Such pumps are known as "diaphragm" pumps and are largely used in pumping liquids which are corrosive or which are laden with grit which would abrade the piston and cylinder.

Appellants have obtained a patent on the pump itself, including in its claims the flexible, tubular members, being patent No. 1832258, granted on an application of which the application involved in this suit is a division. The later divisional application is restricted to the "pumping member" *per se,* which is shown in Fig. 3 of the drawing in the application (R., p. 39).

That member, as shown and described, consists of a flexible, rubber cylinder, having an inturned flange at one end and an outurned flange at the other. These flanges are described as made of fabric and rubber, less flexible than the body of the member.

The claims involved read as follows:

1. An expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end. ①

2. A substantially cylindrical expansible hollow pumping member having open ends, an external annular flange at one end, and an internal flange at the other end.

3. A substantially cylindrical expansible hollow pumping member made of rubber and having open ends, an external annular flange at one end, and an internal annular flange at the other end.

4. A substantially cylindrical expansible hollow pumping member, the body of said member being made of flexible rubber, and the ends of said member being made of less flexible fabric and rubber.

5. A substantially cylindrical expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end, the body of said member being made of flexible rubber and the ends of said member being of less flexible fabric and rubber. ⑤ R. 46

The examiner held these claims unpatentable in view of the following prior art:

Madarasz, 1727474, Sept. 10, 1929.
Farmer, 1790206, Jan. 27, 1931.
Samain et al., (Fr.) 19483, of 1915.

The Board of Appeals, in its decision, referred also to the patent to Dunkle, 1389635, September 6, 1921 (R., p. 68 et seq.), which the Board stated was of record in the parent application and was cited as showing a pump having a diaphragm and used for the same purpose as appellants' pump.

The patent to Madarasz is for an automatic tire gauge. It discloses a flexible, tubular member which is susceptible of elongation under pressure of the air which is forced into the tire. This member has exactly the same structure as appellants' "pumping member", that is, it is tubular and has an inturned flange at one end and an outturned flange at the other.

The French patent to Samain et al., which is for an obturator or cut-off valve, discloses a similar member, that is, a flexible, tubular member having an inturned flange at one end and an out-turned flange at the other.

The patent to Dunkle, cited by the Board of Appeals, shows a diaphragm pump having a flexible, tubular member, though not of exactly the same shape as the one shown in the Stephens application. The operation of the Dunkle pump is generically the same as that of appellants though, as shown, it is a single acting and not a double acting pump, that is, the liquid is forced only on one stroke of the piston and not on each stroke.

The position of the Office was that there was no invention, in view of the art as thus above cited, in making the pumping member of the specified form claimed.

Claims 1, 2, and 3 read literally upon the structure of the Madarasz patent and of the French patent except for the statement that the member is a "pumping member." Claims 4 and 5 additionally include the limitation that the ends of the member are "made of less flexible fabric and rubber", that is, less flexible than the body of the other.

It is to be noted, however, that the patent to Farmer shows a diaphragm for a pump having its edges reinforced.

Appellants, in their brief, argue that the rejection was wrong on the ground that the devices shown in the Madarasz patent and the French patent are in an art non analogous to the pump art.

It is true that neither of those patents shows a diaphragm pump. They do, however, show flexible members adapted to be stretched under pressure and that is exactly the function of appellants' tubular member. When the piston in appellants' pump is reciprocated, the pressure on the oil contained in the member causes the walls of that member to bulge and to produce a pressure on the liquid surrounding the member, thus forcing that liquid from the pump and at the same time draws liquid into the chamber surrounding the other member.

There have been a number of decisions of the courts discussing the question of analogous arts, including the well known decision of the Supreme Court of the United States in *Potts* v. *Creager,* 155 U. S 597, which is cited on page 11 of appellants' brief.

Every case which involves this question must be decided on its own particular facts, and decisions on that question are, at the best, merely analogous. The courts have looked to the general organization of the two machines and their functions in determining whether the arts are so analogous that no invention would be involved in using the device of one machine in the other.

In the case of *Ransome Concrete Machinery Co.* v. *United Concrete Machinery Co.,* 177 Fed. Rep. 413, the Court of Appeals of the Second Circuit held that a tea mixer was in an art analogous to that of concrete mixers notwithstanding the difference of size of the two machines, and held a patent on a concrete mixer invalid because of the existence of a prior patent on a tea mixer. It is to be noted that in that case, as here, the difference between the two machines was largely one of size.

The same was true of the devices involved in *Peele Co.* v. *Security Fire Door Co.,* 58 F. (2d) 230, in which elevator doors and doors for dumb waiters were held to be in analogous arts.

Similarly, in *McKenzie Furnace Co.* v. *Green Engineering Co.,* 138 Fed. Rep. 830, a fire-proof ceiling and a fire arch for furnaces were held to be in analogous arts, and in *Antisdel* v. *Bent,* 122 Fed.

Rep. 811, legs for foldingbeds and legs for chairs were held to be in analogous arts.

It is submitted, therefore, that the claims were properly refused on the ground that there was no invention in making the pumping element of a diaphragm pump, an example of which is shown in the Dunkle patent, of the form shown in the diaphragms of the Madarasz patent and the French patent.

Inasmuch as the application involved in this suit specifies that it is a division of an earlier application and the patent on that earlier application is in evidence in this suit, it is submitted that the Court may take judicial notice of the fact that the patent to Dunkle, referred to in the decision of the Board of Appeals, was not the only patent cited in that earlier application of Stephens.

There was cited also the British patent No. 7172, of 1890, which shows a tubular pumping member of the same shape as that of appellants save that each of the flanges is turned outwardly and the member, instead of being strictly cylindrical, is bulged in the middle. This patent clearly shows that appellants were not the first to use a tubular pumping member in a diaphragm pump. Copies of this British patent will be submitted at the hearing.

It should be noted, further, that appellants' patent No. 1832258 (R., p. 23 et seq.) shows exactly the same structure as shown in the drawings of the divisional application and includes in its claims, for example, claim 7, an "expansible hollow fluid-tight member in one of said chambers and having an open end into which one end of said cylinder extends."

If a patent is granted on the application here involved, the public will not be enabled, when the earlier patent expires, to use the device of that patent since it is not apparent how the pump of that patent could function without using a "pumping member" of exactly the form shown and claimed in the claims here involved.

That patent was granted on November 17, 1931, nearly five years ago, and the effect of granting a patent including the claims here involved is to extend the monopoly of the earlier patent to something more than five years.

It is submitted, therefore, that the claims have been properly refused, that the decree of the lower court should be affirmed, and the bill of complaint dismissed, with costs against the appellants.

R. F. Whitehead,
Solicitor for the Patent Office,
Attorney for Appellee.

September 1936.

U. S. GOVERNMENT PRINTING OFFICE: 1936

NO. 6681

UNITED STATES COURT OF APPEALS OF THE DISTRICT OF COLUMBIA
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IN THE

UNITED STATES COURT OF APPEALS

FOR THE

DISTRICT OF COLUMBIA

STEPHENS PUMP COMPANY AND CHARLES D. STEPHENS,
Appellants,

VS.

CONWAY P. COE, AS COMMISSIONER OF PATENTS OF THE
UNITED STATES OF AMERICA.

BRIEF ON BEHALF OF APPELLANTS

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CONWAY P. COE, AS COMMISSIONER OF PATENTS OF THE UNITED STATES OF AMERICA.

BRIEF ON BEHALF OF APPELLANTS

STATEMENT OF THE CASE

This is a suit in equity brought by Plaintiff in the District Court of the District of Columbia under Section 4915, Revised Statutes (Comp. Stats. 9460, U. S. C. Title 35, Sec. 63, as amended by act of March 2, 1927) to secure an adjudication that Plaintiffs are entitled to a patent for an invention relating to expansible pumping members.

On January 18, 1930, Plaintiff Chas. D. Stephens filed an application for a patent on his pump and expansible pumping member therefor. In compliance with the requirement of division wherein the Patent Office held that the expansible pumping member was a separate subject of invention from the pump as a whole, Plaintiff on August 3, 1931, filed a divisional application on the expansible pumping member, and it is on this divisional application that a patent is now sought. The parent application matured into patent No. 1,832,258 (R. 23), and the divisional application is in the record (Pages 32 through 39).

Plaintiff's said divisional application having been finally rejected by the Examiner (R. 42), Plaintiff appealed to the Board of Appeals (R. 43), which affirmed the Examiner (R. 46). The District Court of the District of Columbia dismissed Plaintiff's Bill of Complaint (R. 10).

The District Court of the District of Columbia based its decision on certain findings of fact and conclusions of law (R. 9-10) to the effect that Plaintiff's claims involved in this suit are unpatentable over the patent to Madarasz 1,727,474 (R. 61), the French patent to Samain, et al 19, 483 (R. 64), Farmer 1,790,206 (R. 72) and Dunkle 1,389,635 (R. 68).

The Dunkle patent being the only reference relating to pumps, and the pumping member disclosed by the Dunkle patent being admittedly different in construction and operation from the pumping member on which Plaintiff seeks a patent, the outstanding question presented for this Honorable Court to decide is whether Plaintiff's invention relating to pumping members is anticipated by the automobile tire gauge of Madarasz and/or the automatic pressure valve of Samain.

ERRORS

The assignment of errors (R. 11) is based principally upon the failure of the Court to hold that the automobile tire gauge patent of Madarasz and the cut-off valve patent of Samain disclose devices in a remote and clearly non-analogous art, and that the devices disclosed by these prior patents were not designed, nor intended nor capable of use as pumping members, and that these devices cannot be considered as anticipatory per se, or in view of the pumping member of Dunkle, as Dunkle's pumping member admittedly differs in both construction and operation.

POINTS OF LAW AND FACT

1. Plaintiff's Pumping Member

The expansible pumping member on which a patent is here sought is disclosed by Fig. 3 (R. 39) of Plaintiff's application and comprises simply a substantially cylindrical expansible hollow pumping member 3 made of rubber and having open ends, an internal annular flange 3a at one end, and an external annular flange 3b at the other.

This hollow expansible pumping member 3 is mounted in Plaintiff's pump as illustrated by Fig. 1 of the Plaintiff Stephens' application (R. 37), *a print of which is attached to this brief.* Referring to this print, the hollow expansible pumping members 3 and 4 are sealed and supported in place by means of their respective flanges 3a, 3b and 4a, 4b, which are stationarily clamped to opposite ends of the pump barrel. The provision of the internal flange on one end and the external flange on the other end of the cylindrical body of the pumping member permits the pumping members to be quickly and easily installed in and removed from the barrels of the pump, and when in place, to be securely supported and yet to freely expand radially.

The members are filled with an actuating fluid indicated in red on said print of Fig. 1 attached to this brief through the openings 2b and 14a. As Stephens points out in his specification (R. 34), this fluid is preferably castor oil. The fluid to be pumped by the pumping member is indicated in blue. This fluid is mud for deep wells. It will be obvious that when the piston 5 is moved back and forth by the rod 6, the pumping members 3 and 4 are alternately contracted and expanded because of the alternate displacement of the actuating fluid indicated in red, and that such expansion and contraction will serve to draw the pumped fluid, indicated in blue, into the pump, and to discharge it from the pump.

2. Practical Problems Solved and Consequent Commercial Success.

Mr. Joseph A. Tennant, who is a consulting engineer and has worked with the pumping member involved in this case for a number of years, discussed the practical problems involved, and his testimony (R. Pages 17 through 21) was given in connection with the commercial embodiments of the Stephens pump illustrated on pages 49 and 55 of the record.

As Mr. Tennant pointed out (R. 20), this pump weighs sixteen thousand pounds, and is *tested to a working pressure of six thousand pounds per square inch* for the reason that the pumps are used for pumping mud in the oil fields in the drilling of wells that may be practically two miles deep, and commonly require a pressure of three thousand pounds and often remain in use twenty-four hours a day for months at a time.

Mr. Tennant explained (R. 21) that a pumping member of this type must be *rigidly anchored at both ends* or it will not function, because the unanchored end will float or be carried away by the mud into the discharge valve opening, and the immense pressure will blow the diaphragm out through the opening. Mr. Tennant pointed out that his Company had lost betwen seventy-five and one hundred pumping members (diaphragms) that were blown out through the discharge port.

Now Stephens solved this problem of keeping the mud out of contact with the piston and working parts by providing a hollow expansible pumping member with an internal annular flange at one end, and an external annular flange at the other, which ends are rigidly secured to the ends of the barrel so that the pumping member cannot be blown through the discharge port, and at the same time is free to expand and contract the required amount radially to cause the pumping of the mud. This pumping member provided by Stephens also has the important advantage of easy installation and removal (R. 19), and as the pumping members are subjected to gruelling wearing action and must be replaced when worn, such ready installation and removal is of vital importance.

3. THE REFERENCES ON WHICH PLAINTIFF'S APPLICATION STANDS REJECTED.

DUNKLE (R. 68)

This is the only reference relating to pumps, and Dunkle's pumping member 11 is radically different from Plaintiff's pumping member.

The Dunkle pumping member 11 is simply a rubber bag closed at one end and not having any flange at either end, whereas plaintiff's pumping member is open at both ends and has an internal annular flange at one end and an external annular flange at the other. The Court below referred to the Dunkle patent as follows: (R. 9) "This diaphragm is of general tubular shape, being closed at one end, and the other end connected to the cylinder in which the piston moves."

Mr. Tennant testified (R. 20) that as the Dunkle patent diaphragm was not anchored at both ends, that it could not perform the function of Plaintiff's pumping member for the reason that the unanchored end would float or be carried away by the fluid against and into the discharge valve opening.

In view of the fact that the remaining references have nothing whatever to do with pumps, it is believed, as hereinafter stated, that the Plaintiff's application should be allowed in view of the admittedly different construction and operation of the Dunkle pumping member.

MADARASZ, SAMAIN AND FARMER

The elastic tube 16 of the automobile tire gauge of Madarasz (R. 61), in view of which applicant has been denied a patent, is not in any sense of the word a pumping member. Its sole function, as stated by Madarasz, page 1, beginning line 79, is to confine the air passing from the point 2 through valve 7, passageway 5 and part 3 into the tire (not shown), so that when the pressure of the air exceeds a predetermined amount it will cause an upward movement of the rod 23 thereby closing passage 5 with valve 8 and opening passage 10 so that a whistling sound is produced to notify the operator that the automobile tire has the required air pressure. Surely this function is utterly unrelated to the function of applicant's pumping member within which an actuating fluid is confined and displaced by a piston to cause the member to expand and contract to draw the mud into and force it out of the barrel of the pump.

The French patent to Samain (R. 76) relates to a pressure regulated cut-off valve. The sole function of the sleeve 89 is to confine the air passing from the pipe 81 through the opening 85a (Fig. 2) and out of pipe 82, so that the pressure of the air may be utilized to move the rods 86b upwardly to bring the part 85a into contact with the part 83a to shut off the flow of air when a predetermined pressure is reached.

There is nothing in Farmer relating to pumps, and this patent is relied on simply to disclose a flexible diaphragm having reinforced portions. It has been used as a reference with respect to claims 4 and 5.

The Examiner held (R. 45) "It may be true that, because the reference devices are pressure actuated valves, whereas applicant contemplates using his tube with a pump, they are slightly non-analogous as to use." The Board of Appeals referring to applicant's claims held (R. 47) "each of the devices of Samain, et al, and Madarasz is an automatic pressure measuring and cut-off valve." Referring to applicant's claims, the Board of Appeals pointed out (R. 48) "They read directly in structural features on Samain, et al, or Madarasz. It is true these claims include reference to this member as being a pumping member, but such term is of broad and indefinite scope." Judge Wheat (R. 49) found that the Madarasz patent discloses an automobile tire gauge, and that the French patent to Samain discloses a cut-out valve.

Neither Madarasz nor Samain discloses or suggests the use of his tubular member for any purpose other than that specifically described. Neither furnishes any explanation of or, indeed, any reference whatever to the internal and external annular flanges of his tubular member. Neither was intended, nor designed nor capable of use as a pumping member. And as the tubular member 16 of Madarasz is surrounded by the metallic tube 18, and as the tubular member 89 of Samain is surrounded by the spring 91, neither Madarasz nor Samain discloses a tubular member mechanically capable of expansion (Tennant testimony, R. 19). Plaintiff's pumping member is defined in each of the claims as an "expansible" pumping member having an internal annular flange at one end and an external annular flange at the other. Plaintiff thus constructs his pumping member so that the displacement of the pumping fluid on the inside thereof will cause its expansion and consequent expulsion of the mud on the outside thereof from the barrels of the pump, all as fully set forth in the Plaintiff's specification, and above referred to.

Therefore, the devices of the patents to Madarasz and Samain are not and do not in any manner whatever relate to pumping members, and as shown are incapable of expansion, and, therefore, incapable of use as pumping members. And these facts, it is submitted, constitute further proof of the error of ignoring purposes and functions and considering only structural similarities.

4. SUMMARY OF PATENTABLE DIFFERENCES.

It is erroneous as a matter of law and common justice to base a decision on whether an applicant for a patent is entitled to a patent solely on a comparison of the mechanical structure of Plaintiff's device with the devices of an entirely non-analogous art. It is believed to be settled law that a patent should not be denied on the ground that a similar mechanical structure is disclosed by a patent in a non-analogous art.

Turning aside then from the purely academic comparison of mechanical similarities between applicant's device and the devices of Madarasz and Samain, and comparing the purpose and function of applicant's device with the devices of Madarasz and Samain, it is submitted as a matter of common sense that no mechanic in the deep well slush pumping art, or for that matter in any pump art, observing the use by a filling station attendant of an automobile tire pressure gauge such as that shown by Madarasz or the pressure regulating valve of Samain would be led to design Plaintiff's pumping member for deep well mud pumps. How can it reasonably be said that the measurement of the pressure of air in an automobile tire is analogous to the pumping of mud under pressures of several thousand pounds per square inch? And so it is submitted that on this ground alone, the decree of the lower court should be reversed.

Still insisting, and we believe with good reason, that automobile tire pressure gauges and pressure valves such as shown by Madarasz and Samain are in an art so utterly remote from and unrelated to the pumping art that no mechanic with the ordinary skill of his calling would be led to take devices from that non-analogous art and adapt them for use in the pumping art, we wish now to make it clear to this Honorable Court that even if a mechanic should conceive of the use of such a pressure gauge construction in a pump, he would not be able to simply take these pressure gauge devices and put them to use in the pumping art, because as a matter of fact these pressure gauge devices are incapable of such use.

Plaintiff's pumping member is an expansible pumping member, and each of the rejected claims so states. As the Madarasz (R. 61) elastic tube 16 is surrounded by the metallic tube 18, *said elastic tube is not expansible;* and as the elastic tube 89 of Samain (R. 64) is surrounded by the coil spring 91, *it is not an expansible member.*

As Mr. Tennant has pointed out in his testimony, the practical problem solved by Stephens was to provide a hollow expansible pumping member with an internal annular flange at one end and an external annular flange at the other so that the ends could quickly and easily be sealed and rigidly fixed to the ends of a pump barrel to permit radial expansion of the pumping member and to prevent its being blown through the discharge port. No prior patent teaches or suggests that, and certainly Madarasz and Samain do not suggest it for the reason that only one end of the elastic members 18 of Madarasz and 89 of Samain is fixed, the other being free to move.

In view of the foregoing, it is respectfully submitted that the Madarasz and Samain patents not only disclose devices that are in a non-analogous and utterly remote art, but they disclose devices that are not intended, designed or capable of use as pumping members, and that the court below has erred in rejecting applicant's claims which specifically define his pumping member.

5. THE LAW.

This Honorable Court is intimately familiar with the law relating to the denial of a patent in view of non-analogous art, but for convenient reference, we would refer to the following:

Walker on Patents, Sixth Edition, Section 76. "It is not invention to use an old process, machine, manufacture, composition of matter or design for a new and analogous purpose."

Section 77. "It may be invention to use an old process, machine, manufacture, composition of matter or design for a new and non-analogous purpose. The question whether a particular new use is analogous or is non-analogous to some old use of the same process or thing, is a question, the answer to which depends upon the particular facts of the case in which it arises."

Invention and the Law (1936)—Toulmin (P. 149-150.)

"No. 33. *Use of old thing for new and non-analogous purpose.* The quality of the imagination that is the foundation of invention is exemplified by the ability of the inventor to take an old piece of apparatus, or an old instrumentality, and transplant it into an entirely new field, not related to it in any way, thereby accomplishing a result in that field which is both new and useful."

The leading case in the Supreme Court is *Potts vs. Creager, 155 U. S. 597*, wherein the Court said: (P. 606)

> "If the new use be analogous to the former one, the court will undoubtedly be disposed to construe the patent more strictly, and to require clearer proof of the exercise of the inventive faculty in adapting it to the new use—particularly if the device be one of minor importance in its new field of usefulness. On the other hand, if the transfer be to a branch of industry but remotely allied to the other, and the effect of such transfer has been to supersede other methods of doing the same work, the court will look with a less critical eye upon the means employed in making the transfer."

And: (P. 607)

> "*Indeed, it often requires as acute a perception of the relation between cause and effect, and as much of the peculiar intuitive genius which is a characteristic of great inventors, to grasp the idea that a device used in one art may be made available in another, as would be necessary to create the device de novo.* And this is not the less true if, after the thing has been done, it appears to the ordinary mind so simple as to excite wonder that it was not thought of before. The apparent simplicity of a new device often leads an inexperienced person to think that it would have occurred to any one familiar with the subject; but the decisive answer is that with

> dozens and perhaps hundreds of others laboring in the same field, it had never occurred to any one before." (Italics ours.)

Following this rule in *Application of Eiermann, 287 Fed. 1016*, this Honorable Court reversed the decision of the Commissioner of Patents, and said: (P. 1017)

> "We think there is nothing in the formation of a saw blade which would suggest to one skilled in the art the adoption of the saw blade as a blade for a scraper. They belong to different arts. Nor is their use so associated as to suggest readily the conversion of the saw blade into a garage scraper. We think the idea of adapting the design disclosed in the saw blade into a scraper blade is sufficiently novel to amount to invention."

This Honorable Court again applied this rule in *In Re Murray, et al, 29 Fed. (2) 863*, holding that the art of electric welding as employed in the Plaintiff's invention was not comparable to the crude methods of cement construction used in the building trades, and thereupon reversed the decision of the Board of Appeals.

In the case of *In Re Luks, 69 Fed. (2) 552*, the Court of Customs and Patent Appeals reviewed the authorities relating to non-analogous art, and held that a prior patent relating to an apparatus for cleaning and polishing automobiles did not anticipate plaintiff's invention, which related to an apparatus for milking cows.

In *Diamond State Iron Company, et al, vs. Goldie, et al, 84 Fed. 972*, the Third Circuit Court of Appeals refused to declare a patent for a railroad spike invalid in view of a prior patent on a horse shoe, saying (P. 975):

> "Neither do we consider the Kingsland horse nail patent No. 191,242, to be in any way anticipatory of the

Goldie patent. Its use and functions are different. It was adapted to an entirely different art from a spike. Electric Co. vs. La Rue, 139 U. S. 601, 11 Sup. Ct. 670; Potts & Co. vs. Creager, 155 U. S. 606, 15 Sup. Ct. 194."

SUMMARY AND CONCLUSION

At the conclusion of the testimony in the court below, counsel for the Commissioner of Patents stated that there was no dispute about the facts involved, and the Court expressed the same opinion (R. 21). These facts are:

(1) Plaintiff is the first to produce a hollow expansible pumping member having an internal annular flange at one end, and an external annular flange at the other.

(2) This pumping member has been put to practical and highly successful use, and has solved a real and substantial problem. It is quickly and easily installed in and removed from a pump barrel, and when installed therein its internally and externally flanged ends remain in place while its body expands and contracts to pump the mud at pressures of several thousand pounds per square inch.

(3) The Dunkle patent is the only reference relating to pumping members, and it is in the form of a bag closed at one end and having no flanges whatever. Its construction and operation are obviously different.

(4) *Neither Madarasz nor Samain nor Farmer discloses a pumping member.* Madarasz relates to an automobile tire pressure gauge, and Samain to a pressure valve. Farmer simply discloses a reinforced diaphragm. The alleged anticipating elastic tubes of Madarasz and Samain are so confined by metallic members that they are incapable of expansion. The sole function of the Madarasz and Samain tubes

is to elongate and thereby effect closure of a valve upon predetermined pressures.

Plaintiff's patent application has been erroneously rejected upon an academic comparison of purely structural similarities between Plaintiff's pumping member and the automobile tire pressure gauges and pressure valve of Madarasz and Samain which are in an utterly remote and non-analogous art, and were not designed nor intended nor capable of performing the function of Plaintiff's pumping member.

It is submitted, with all due respect to the tribunals below, that the adverse decisions appealed from are academic and technical, and constitute a departure from the letter and spirit of Art. 1, Sec. 8, Cl. 8 of the Constitution which states that the broad, general object of the patent laws shall be "to promote the progress of science and useful arts." Surely progress in the art of pumping mud in deep wells under pressures of thousands of pounds per square inch cannot be promoted by the denial of patents to inventors in that art in view of prior automobile tire pressure gauges.

It is, therefore, respectfully submitted that the decree of the District Court is erroneous, and should be reversed, and that the Commissioner of Patents should be directed to issue the patent to Plaintiff.

Respectfully submitted,

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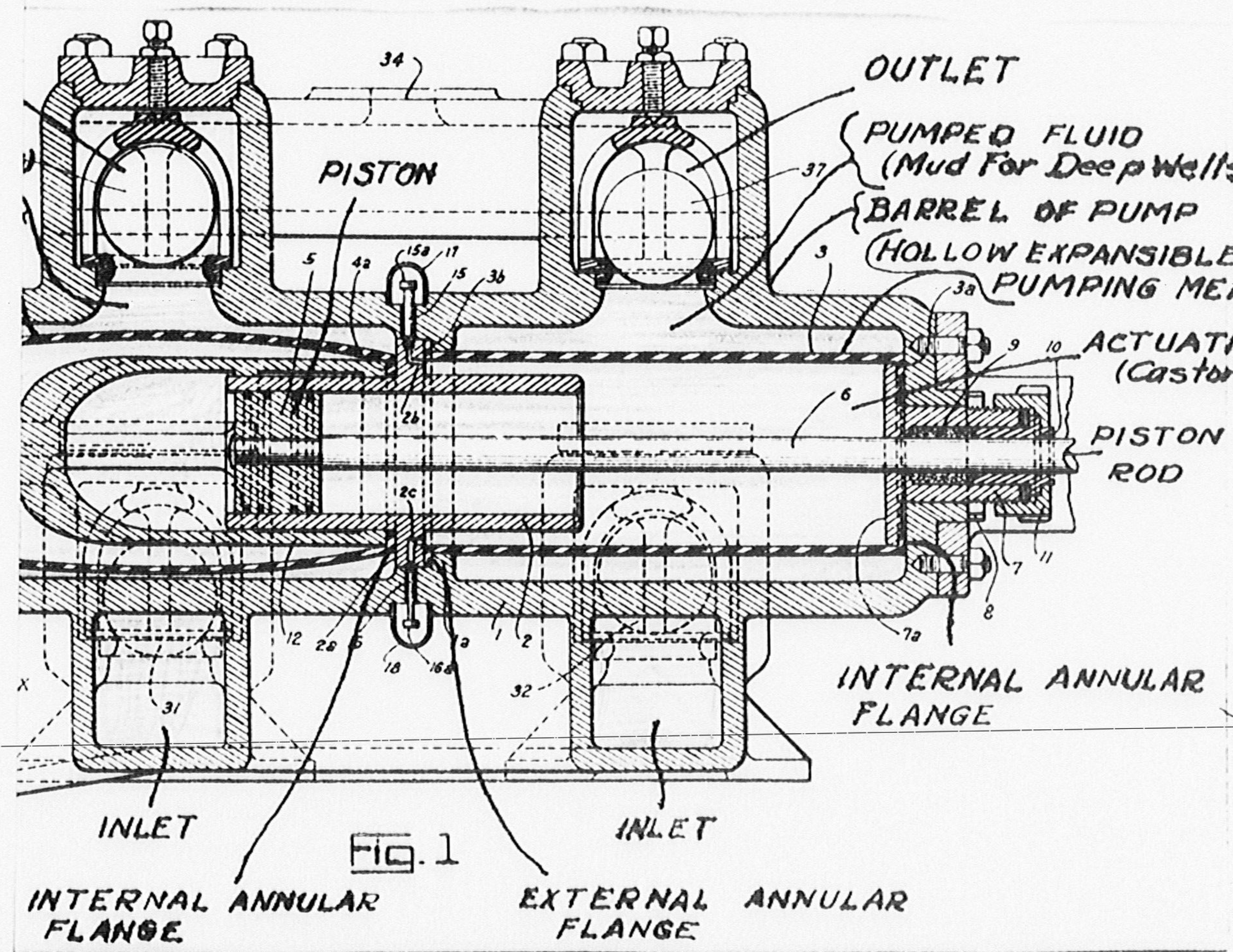

OUTLET
PUMPED FLUID
(Mud For Deep Wells)
BARREL OF PUMP
HOLLOW EXPANSIBLE
PUMPING MEMBER
ACTUATING FLUID
(Castor Oil)
PISTON
ROD
PISTON
INTERNAL ANNULAR
FLANGE
INLET
INLET
INTERNAL ANNULAR
FLANGE
EXTERNAL ANNULAR
FLANGE
34
37
3
3a
3b
4a
5
15a
17
15
2b
2c
6
9
10
7
8
11
7a
12
2a
18
16a
1a
1
2
32
31
X

Fig. 1

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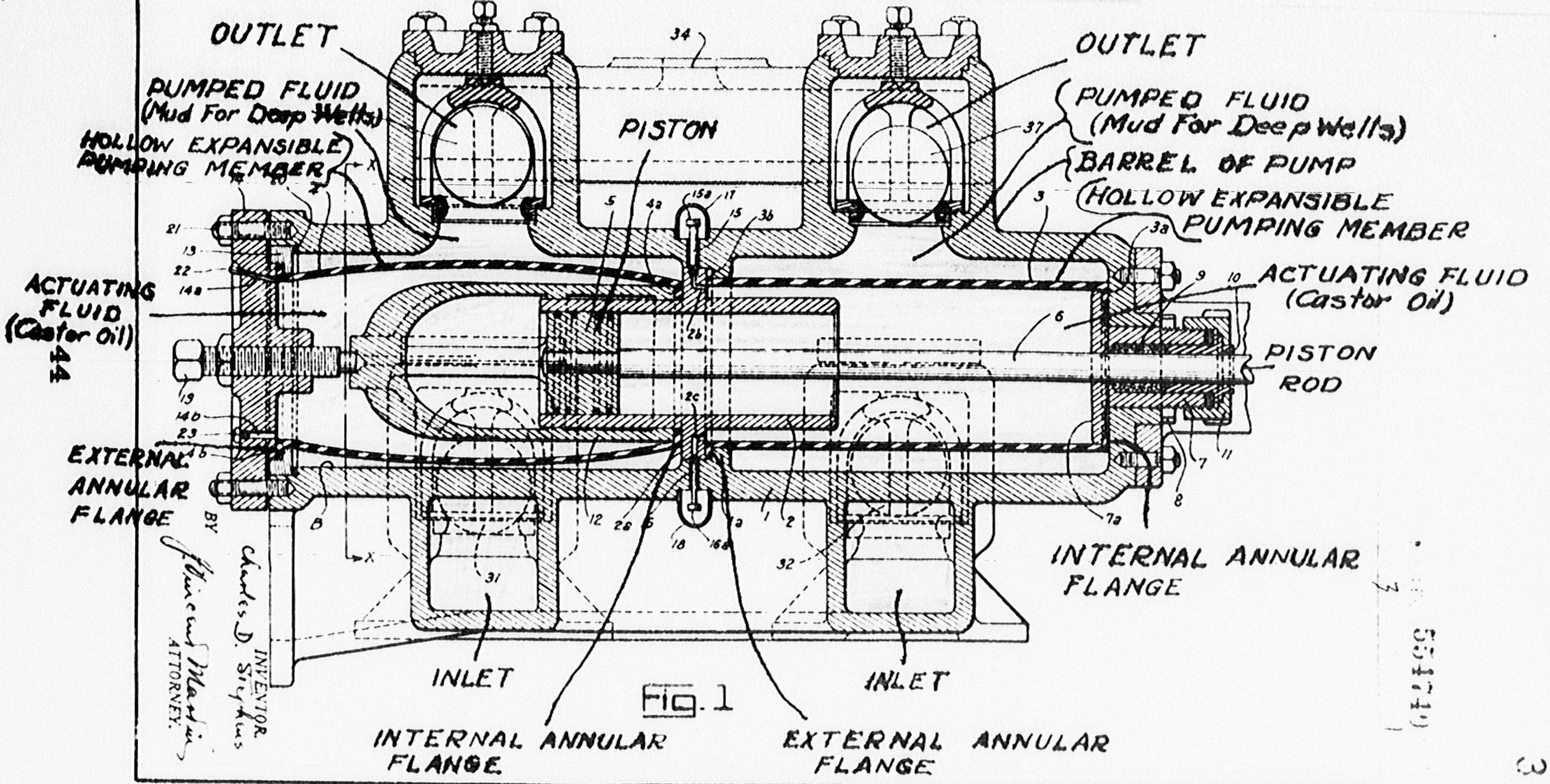

Fig. 1

INVENTOR.
Charles D. Stephens
BY
J. Vincent Martin
ATTORNEY.

1. An expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end.

2. A substantially cylindrical expansible hollow pumping member having open ends, an external annular flange at one end, and an internal flange at the other end.

3. A substantially cylindrical expansible hollow pumping member made of rubber and having open ends, an external annular flange at one end, and an internal annular flange at the other end.

4. A substantially cylindrical expansible hollow pumping member, the body of said member being made of flexible rubber, and the ends of said member being made of less flexible fabric and rubber.

5. A substantially cylindrical expansible hollow pumping member having an internal annular flange at one end and an external annular flange at the other end, the body of said member being made of flexible rubber and the ends of said member being of less flexible fabric and rubber.

UNITED STATES
COURTOFAPPEALSFORT
DISTRICT OF COLUMBI
FILED DEC 8 - 1936

CLER

No. 6681

IN THE

United States Court of Appeals

FOR THE

DISTRICT OF COLUMBIA

STEPHENS PUMP COMPANY and CHARLES D. STEPHENS,
Appellants,

vs.

CONWAY P. COE,
as Commisioner of Patents of the United States of America.

APPELLANTS' REPLY BRIEF

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Attorneys for Appellants.

THE REIN COMPANY-HOUSTON

No. 6681

IN THE

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STEPHENS PUMP COMPANY and CHARLES D. STEPHENS,

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APPELLANTS' REPLY BRIEF

I. REASON FOR THIS REPLY BRIEF

In his brief for the Commissioner of Patents the Solicitor asserts that a patent should be denied Plaintiff in this case in view of the issuance of a patent to plaintiff on a parent application, of which the application in this case is a division. The Solicitor also offers as an anticipation of the claims sought by Plaintiff, British patent 7172. This patent was not considered by the Court below, and the Solicitor urges that this Honorable Court should take judicial notice of it in view of the fact that it was cited against the parent application.

The purpose of this reply brief is to respond to these unexpected contentions.

II. THE ISSUANCE OF A PATENT TO PLAINTIFF ON HIS PARENT APPLICATION IS NO BAR TO THE ISSUANCE OF A PATENT ON THE DIVISIONAL APPLICATION IN THIS CASE.

The Solicitor contends that Plaintiff should be denied a patent in this case on the pumping member because several years ago patent 1,832,258 was issued to him on his pump as a whole. The Solicitor states (Brief Page 8), "If a patent is granted on the application here involved, the public will not be enabled, when the earlier patent expires, to use the device of that patent, since *it is not apparent how the pump of that patent could function without using a 'pumping member' of exactly the form shown and claimed in the claims here involved.*"

"That patent was granted on November 17, 1931, nearly five years ago, and the effect of granting a patent including the claims here involved is to extend the monopoly of the earlier patent to something more than five years." (Italics ours.)

There is no evidence in the record to support the Solicitor's statement in italics above. And this is the sole ground on which he urges that the issuance of a patent to Plaintiff would extend the monopoly. It cannot be said that the claims of Plaintiff's patent 1,832,258 and the claims here involved are the same, or that they differ merely in scope.

The claims of Plaintiff's said patent No. 1,832,258 define the pump, and not one of them defines a pumping member having an internal annular flange at one end and an external annular flange at the other, either per se or as an element of the pump. The pumps *can* be used with pumping members otherwise formed, and so the combination claims of said patent refer generally to a pumping member.

On the other hand, the pumping member *can* be used in pumps other than the pump covered by said patent, and Plaintiff now seeks a patent on said pumping member per se.

The issuance of a patent on this pumping member could in no possible way extend the monopoly of the patent on the pump.

That the pump on the one hand and the pumping member on the other are independent and separate inventions, patentable as such, is shown by the following record in the Patent Office.

When plaintiff filed his original application for patent 1,832,258, he included in said application claims directed to his pump as a whole, and claims directed to his pumping member. The Patent Office held that the claims on the pumping member should be incorporated in a separate divisional application because the pumping member was a separate subject of invention from the pump as a whole, and, therefore, required division. The plaintiff complied with the requirement of the Patent Office, withdrew from the pump application the claims relating to the pumping member, and thereupon filed the application on the pumping member, which latter application is involved in the present case.

This is revealed by the opinion of the Board of Appeals. Thus, the Board (R. 46) said: "The pump as an organization has been allowed in applicant's prior application Serial No. 421,651, now patent 1,832,258, dated November 17, 1931. The present application is a division of the prior application." And (R. 47) said: "The claims presented in this divisional application relate entirely to the tubular rubber diaphragm element. *This division was made in compliance with a requirement in the parent case, wherein it was held that this diaphragm element is a separate subject of invention from the pump as a whole.*" (Italics ours.)

How can it with reason be said that the Patent Office has the legal right and duty to say to an applicant, "We will not grant you a patent on this application because you have disclosed two separate inventions, one relating to the pump as a whole and one relating to the pumping member for the pump, and you must therefore file a divisional application on one of them;" and when plaintiff has complied with this requirement of the Patent Office and filed a divisional application for a patent on the pumping member, for the Patent Office to say, "We will deny you a patent on this divisional application relating to the pumping member because the patent on the parent application relating to the pump as a whole was granted several years ago. We know that you filed this divisional application in compliance with our requirement, and we know that the delay in obtaining a patent on this divisional application is no fault of yours, but we nevertheless refuse to grant you a patent on this divisional application."

Now, there is no support in law or in equity for this position; and it would be manifestly unjust to deny the plaintiff a patent on this ground.

But aside from this position, the fact is, as above stated, that the two inventions as defined by the claims, are separate and independent of each other, and that being true, there can be no extension of the monopoly.

There is no evidence to support the Solicitor's assertion that the pump cannot be used without this particular pumping member, and he has cited no authorities to support his position that a patent should be denied on that ground.

We wish to call the Court's attention to the recent decision of the Court of Customs and Patent Appeals *In Re Carlton*, 77 Fed. (2) 363, involving a fact situation practically identical with that in the present case. In that case the appellant's divisional application had been rejected on the patent granted on the parent application. The Court stated (P. 365):

> "It may be that the invention defined by the appealed claims could not be used, except in combination with the other elements referred to in the claims of the patent. It may be observed, however, that such might be the case with the invention defined by the allowed claims in the case at bar."
>
> * * *
>
> "We deem it unnecessary to cite authorities in support of the proposition that a party might be entitled to a patent for 'a combination,' because of the co-operation of the elements contained therein, and at the same time be entitled to a separate patent for one of the elements of the combination. Such, we think, is the situation confronting us here.
>
> "We are of opinion, therefore, that the mere fact that appellant included in his patented combination

the element of composition of matter here involved, does not preclude him from receiving a patent for the composition of matter defined by the appealed claims.

"There has been some discussion in the briefs of counsel for the parties relative to the legal effect of the requirement of division between the claims of the Carlton patent, and the claims of the present application, because division was required between the claims of appellant's patent and the subject-matter defined by the appealed claims.

"The Solicitor for the Patent Office relies upon the case of In re Isherwood, 46 App. D. C. 507, in support of the proposition that, under the circumstances in the case at bar, the requirement of division has no bearing on the question at issue. It may be said in this connection that there are exceptions to the rule announced in that case. See In re Walter H. Cady, 77 F. (2d) 106, 22 C. C. P. A. (Patents)—"For the reasons herein stated, the decision of the Board of Appeals is reversed."

III. THE PUMPING MEMBER OF BRITISH PATENT 7172 IS ADMITTEDLY NOT OF THE SAME FORM AND PLAINTIFF'S FORM IS SAID TO BE ESSENTIAL IN THESE MUD PUMPS.

We wish to call the Court's attention to the fact that the British patent 7172, on which the Solicitor relies, is now introduced into this case for the first time. Obviously, the Solicitor must feel that the other prior patents considered up to this time do not anticipate plaintiff's invention. If it were not so, there would be no reason for him to introduce this British patent.

And in regard to this British patent, the Court's attention is respectfully invited to the fact that while the Examiner of the Patent Office cited it in the original application on which Plaintiff's patent 1,832,258 issued, and this British patent has therefore been before the Examiner throughout the proceedings, the Examiner did not cite it against the divisional application now before this Honorable Court, that is, the application relating to Plaintiff's pumping member per se. And the only reasonable assumption is that the Examiner, having this patent before him from the beginning, was of the opinion that it did not anticipate Plaintiff's claims directed to the pumping member per se.

The Solicitor's brief sets forth two propositions:

First, that the pumping members of the Dunkle patent and the British patent are not of exactly the same form as Plaintiff's pumping member.

As to the Dunkle patent, the Solicitor states (Brief, page 4) that it is "not of exactly the same shape," and as to the British patent (Brief, page7) that it is "of the same shape as that of appellant's save that each of the flanges is turned outwardly and the member, instead of being strictly cylindrical, is bulged in the middle."

Second, "* * * it is not apparent how the pump of that patent could function without using a 'pumping member' of exactly the form shown and claimed in the claims here involved." (Brief, page 8.)

Now, these propositions support the contention Plaintiff has made from the outset to the effect that the prior pumping members are not the same as Plaintiff's pumping member, and that the exact form of Plaintiff's pumping member is important. The Solicitor's statement, first, that the pumping members of Dunkle and British are not of exactly the same form as Plaintiff's pumping member, and second, that the pumps involved here could not function without using a pumping member "of exactly the form shown and claimed in the claims here involved," do not support his conclusion that the form is immaterial.

And we, therefore, respectfully submit that Plaintiff is entitled to a patent with claims specifically directed to the exact and admittedly important form of his pumping member.

IV. CITED AUTHORITIES DISTINGUISHED.

The only authorities cited by the Solicitor are those relating to the rejection of applications in view of analogous art. (Brief, page 6.)

We agree with the Solicitor's statement that every case involving this question must be decided on its own particular facts, and further that in answering the questions presented the court must look to the general organization of the two machines, and their *functions* in determining whether the arts are so analogous as to justify the rejection of an application for a patent on a device in one art in view of the disclosure of a patent in another art.

In order to bring this case within the authorities cited by the Solicitor, *it is essential that the purposes and functions of the two devices be considered.* We are unable to find in the Solicitor's brief any explanation of how the utterly unrelated and non-analogous prior devices of Madaraz and the French patent to Samain are capable of performing the function performed by Plaintiff's pumping member. After referring to the Madaraz device and the French patent to

Samain on page 4 of his brief as an automatic tire gauge and cut-off valve, respectively, the Solicitor states (Brief, page 5), "It is true that neither of these patents shows a diaphragm pump. They do, however, show flexible members adapted to be stretched under pressure and that is exactly the function of appellant's tubular member."

The Solicitor offers no explanation, however, to support this broad statement. Instead, in the immediately following sentence, he points out the operation of appellant's pumping member, which is obviously utterly different from that of the tire gauge and valve of said prior patents. The Solicitor states "When the piston in appellant's pump is reciprocated, the pressure on the oil contained in the member causes the walls of that member to bulge and to produce a pressure on the liquid surrounding the member, thus forcing that liquid from the pump, and at the same time draws liquid into the chamber surrounding the other member."

Now the sentence just quoted is an accurate description by the Solicitor of the function of Plaintiff's pumping member, and it cannot in any way be applied to the tire gauge and valve of Madaraz or the French patent to Samain. In the first place, there is no oil in the member of Madaraz or Samain; in the second place, the walls of that member are not caused to bulge to produce a pressure on any liquid surrounding the member because there is no liquid surrounding the member; and in the third place, the pressure is not produced to force the liquid from the pump and draw liquid into the chamber because there is no liquid to force or draw.

In other words, the tire gauges and valves of those patents were never designed for, intended to be used, or capable of use as a pumping member for deep well mud pumps, or for any pump.

The Solicitor cites *Ransome Concrete Machinery Company vs. United Concrete Machinery Company*, 177 Fed. 413, stating that in that case as here the difference between the two machines was largely one of size. We disagree with the Solicitor's construction of this opinion, and call the Court's attention to the statement on page 416 of 177 Fed., where the Court said:

> "In view of the patent, we cannot say that the Burns apparatus is exclusively a tea mixer. Nor are we certain that the patent in suit should be treated as exclusively a concrete mixer. *Both devices are mixers. Their purpose is to mix materials.* Changing materials does not change their purpose." (Italics ours.)
>
> * * *
>
> "It is rather a case of changing the materials to be operated upon than of changing the method of operation."

The Solicitor also cites *Peele Company vs. Security Fire Door Company*, 58 Fed (2) 230. It is believed that elevator doors and doors for dumb waiters are clearly analogous, and this case is, therefore, not in point.

The next case cited by the Solicitor is *McKenzie Furnace Company vs. Green Engineering Company*, 138 Fed 830. Here again the two articles were clearly analogous, that is, an arch for a furnace and an arch for a fire-proof ceiling. The Court pointed out (page 822 of 138 Fed.) that brick masons and steel workers were familiar with the art, and further that it had already been suggested by others that ceiling construction was transferable to furnaces.

The Solicitor then cites *Antisdel vs. Bent*, 122 Fed. 811, which properly holds that the use of a mechanism in a folding bed which had been used prior thereto in a folding chair without substantial change in the manner of operation and result, is an analogous use.

Beginning on page 8 of Plaintiff's main brief, we have shown that the automatic tire gauge of the prior patent to Madaraz, and the cut-off valve of the prior French patent to Samain are not only not pumping members, but were not designed, intended or capable of use as such, and we respectfully request that the Court consider these arguments in the light of the authorities.

Respectfully submitted,

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Stone, Boyden & Mack,
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